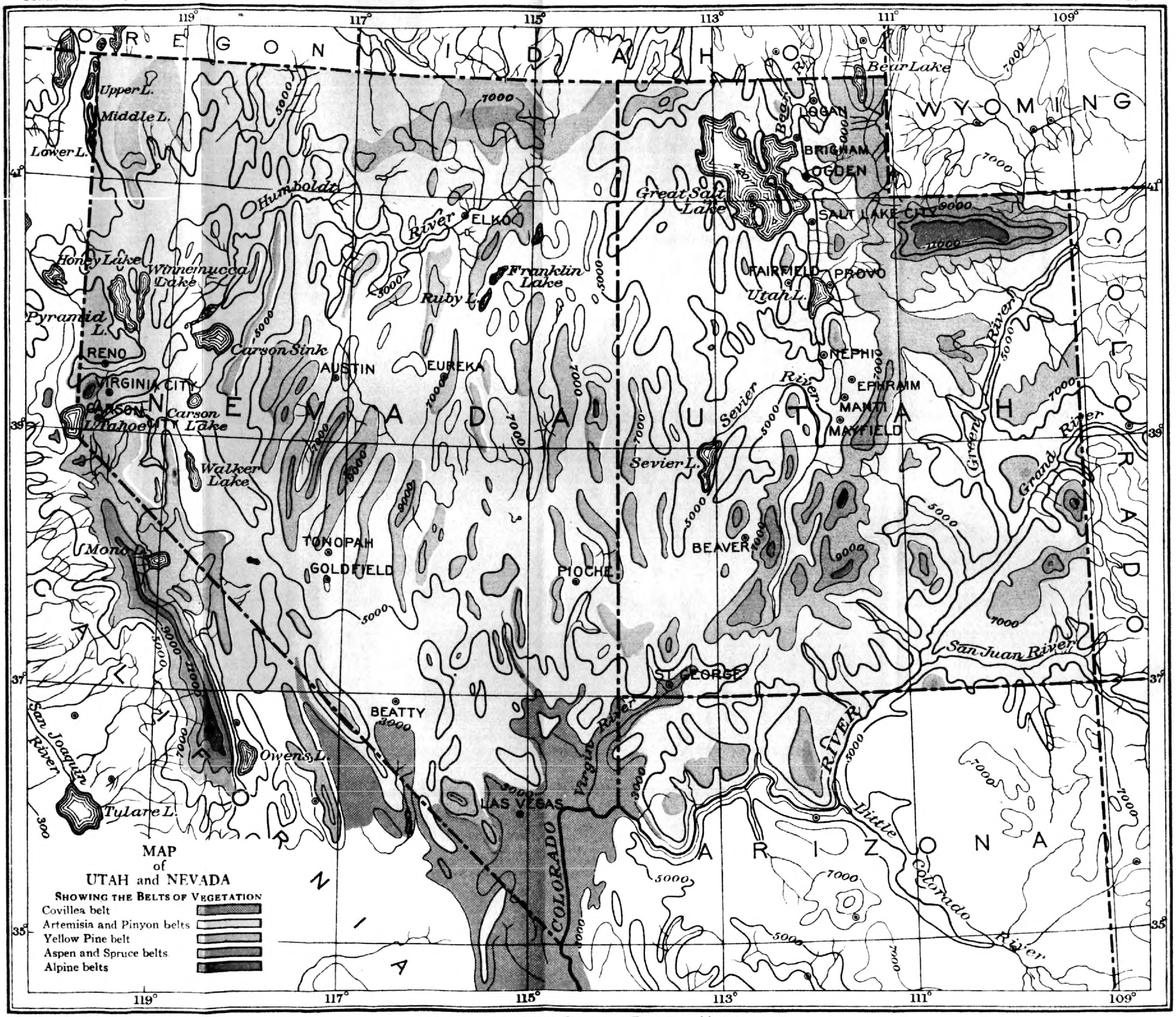


MAP
of
UTAH and NEVADA

SHOWING THE BELTS OF VEGETATION

- Covillea belt
- Artemisia and Pinyon belts
- Yellow Pine belt
- Aspen and Spruce belts
- Alpine belts

MAP OF UTAH AND NEVADA SHOWING BELTS OF VEGETATION

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 25

FLORA OF UTAH AND NEVADA

By IVAR TIDESTROM

WASHINGTON
GOVERNMENT PRINTING OFFICE
1925

ADVERTISEMENT

The United States National Herbarium, which was founded by the Smithsonian Institution, was transferred in the year 1868 to the Department of Agriculture, and continued to be maintained by that department until July 1, 1896, when it was returned to the official custody of the Smithsonian Institution. The Department of Agriculture, however, continued to publish the series of botanical reports entitled "Contributions from the United States National Herbarium," which it had begun in the year 1890, until, on July 1, 1902, the National Museum, in pursuance of an act of Congress, assumed responsibility for the publication. The first seven volumes of the series were issued by the Department of Agriculture.

ALEXANDER WETMORE,
Assistant Secretary, Smithsonian Institution.

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM
Issued October 31, 1925

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PREFACE

The present volume of the Contributions is devoted to a flora of Utah and Nevada and that portion of Arizona lying northwest of the Colorado River. The work was prepared by Mr. Ivar Tidestrom, of the Department of Agriculture, with the assistance of others having special knowledge of certain groups. The chapter on the plant ecology of the desert areas was prepared by Dr. H. L. Shantz, of the Bureau of Plant Industry, who has devoted many years to the study of the vegetation of our arid regions. The ecology of the mountain flora was prepared by Dr. A. W. Sampson, formerly of the Forest Service, now associate professor of range management and forest ecology in the University of California. For several years Doctor Sampson conducted range investigations for the Forest Service in Utah.

The systematic treatment is based on the large collections of specimens in the United States National Herbarium and the Forest Service. Of these Mr. Tidestrom himself has collected nearly 8,000 numbers. His botanical journeys in the Western States range from the plains of Colorado to California and from southern Arizona to central Idaho. From 1907 to 1911 he botanized principally in Utah, but made trips into Colorado, Arizona, Idaho, and southern Oregon. In 1919 he spent six months in Nevada, exploring particularly the border region of Nevada and California from the Colorado River to Lake Tahoe. He also traversed the State from west to east, following the 39th parallel and making numerous excursions into the mountains of central Nevada to the north and south of that parallel. The number of species treated is approximately 3,700. Notwithstanding the large amount of field work already accomplished from the days of Sereno Watson, Lester F. Ward, and others down to the present time, many remote districts, particularly of Nevada, are still imperfectly known. Further study of these remote regions will give us a better understanding of our species, since many of these are known at present only from isolated localities. Only the flowering plants and ferns of the region are contained in the present work. The keys to the species and larger groups are arranged so that the volume may be used as a field manual by investigators and rangers having a knowledge of elementary botany.

In the introductory discussion Mr. Tidestrom has shown conclusively that the hand of science points toward Spain as a fertile field for the American agricultural explorer, who can expect to learn there, from well-established practices resulting from many centuries of agricultural experience, much that will be of value in our similar but new Southwest.

This is the fifth volume of the Contributions to be devoted to a State flora, the others being the Botany of Western Texas (vol. 2), the Plant Life of Alabama (vol. 6), the Flora of Washington (vol. 11), and the Flora of New Mexico (vol. 19).

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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FLORA OF UTAH AND NEVADA

By Ivar Tidestrom

INTRODUCTION

The region embracing the States of Utah and Nevada is much diversified as to both topography and plant covering. Though lying wholly within the arid portion of the United States, it contains high mountains separated one from another by dry desert valleys or by table-lands. The region affords a highly varied topography, and its flora ranges from arctic to subtropical and from truly desert elements to the humid elements of the Rocky Mountains and the Sierra Nevada. With the one hundred and ninth meridian for its eastern boundary and the one hundred and twentieth for its western, the greatest breadth is about 890 kilometers (554 miles). The forty-second parallel borders the region on the north and the thirty-fifth on the south, making its greatest length about 780 kilometers (485 miles).

Within this region the flora typical of the western United States meets the flora typical of northern Mexico. The line of demarcation between these floras is conspicuous in southwestern Utah and southern Nevada, where it coincides with the northern limit of *Covillea tridentata*, the creosote-bush, and to some extent with that of *Clistoyucca brevifolia*, the Joshua-tree.

The general north and south trend of the mountain ranges and their great height favor such meeting or "dovetailing" of floras. A cross section of these valleys and mountain ranges is shown in the profile of Nevada along the thirty-ninth parallel. (Fig. 1.) From this we learn that the center of that State lies at a higher elevation than either the eastern or the western portions. Near both ends of the profile the elevation above sea level is about 1,500 meters or even less. In the center it averages 1,800 meters. In southern Nevada, on the other hand, the average elevation of the desert floor above sea level is about 600 meters, as in the region about Las Vegas. The drainage of the river systems, in so far as Utah and the southern half of Nevada are concerned, tends toward the south, and the outlet of this system is the Colorado River. There are a number of tribu-

taries to this river, of which the most noteworthy are the Green River, with its sources in northwestern Wyoming, the Grand River flowing from the Rocky Mountains, and the Virgen, including Muddy River, from southern Utah and south-central Nevada. Besides, there are a number of desert valleys in southern Nevada, which, when storms change the dry stream beds into streams, drain not into the sea but into Death Valley or other sinks on the lower deserts.

The lower course of the Colorado River passes through the Colorado Desert, and if we pass northward and follow each tributary to its source we make a gradual ascent from the desert to the line of perpetual snow. Thus the Colorado valley and the valleys of its numerous tributaries favor the migration of the Mexican species northward. These ascend northward as far as the climatic and other factors agree with their life requirements.

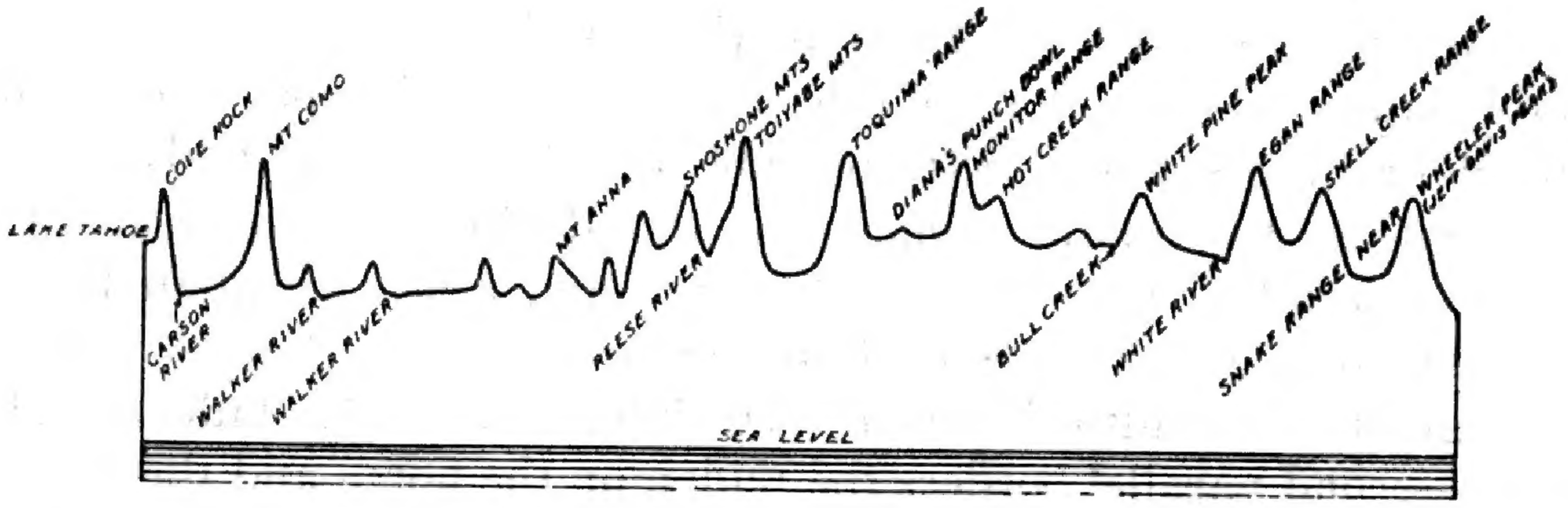


FIG. 1.—**Profile of Nevada along the 39th parallel. Horizontal scale, 1 inch equals 90 miles (145 kilometers); vertical scale, 1 inch equals 1,200 feet (367 meters)**

The characteristic shrub of the lower deserts, *Covillea tridentata*, the creosote-bush, reaches its northern limit at about 1,100 meters above sea level. This boundary is very tortuous: it begins near the Hurricane fault in southern Utah and runs westward to the mouth of Tule Canyon, south of Goldfield, in Nevada; at this point it passes into California. The region dominated by creosote-bush may be called the lower desert floor, which, properly speaking, belongs to the Mexican flora. Within this region rise mountains ranging in height from 900 to 4,000 meters. The low ranges are devoid of trees, or bear junipers and pinyons, usually scattered but sometimes forming a low forest cover. One range, the Charleston Mountains, rises to a height of nearly 3,300 meters (10,874 feet), and here all the higher belts of vegetation are represented except the truly alpine.

The altitudinal range of Utah and Nevada extends from 200 meters above sea level to about 4,000 meters (Wheeler Peak, eastern Nevada, 13,005 feet, locally known as Jeff Davis Peak), and if we ascend to the higher plateaus or mountain ranges, we pass through definite belts or zones of vegetation, each of which is dominated by a characteristic shrub or tree.

Ascending from the lower desert to the upper desert area we meet with the true sagebrush, *Artemisia tridentata*, which at about 1,200 meters elevation becomes the dominant element of the vegetation. This shrub ranges northward to the northern boundary of the United States and is the principal element of the arid flora from central Utah and Nevada northward. Continuing our march upward, we reach the foothills of the great mountain ranges, and here we find the juniper-pinyon association. Above that is the yellow pine, which dominates the plateaus, particularly the Kaibab Plateau in northern Arizona and southern Utah. In the interior of Nevada this tree is replaced by mountain-mahogany, *Cercocarpus ledifolius*. Above the yellow pine there are aspen areas, and at an elevation of about 2,700 meters above sea level we find Engelmann spruce and subalpine fir forming the spruce belt. At about 3,300 meters elevation we reach the alpine belt.

The monumental work of Dr. C. Hart Merriam forms the basis of the classification of belts used in this work. The nomenclature, however, has been changed for the sake of convenience, each belt being designated in terms of its most conspicuous floristic element. The concordance of the various belts is as follows:

Merriam.	Present work.
Arctic.	Alpine.
Hudsonian.	Subalpine (*Pinus albicaulis*).
Canadian.	Spruce (*Picea engelmanni*).
	Aspen (*Populus aurea*).
Transition.	Yellow Pine (*Pinus ponderosa* and *P. brachypteru*).
Upper Sonoran.	Pinyon (*Pinus monophylla*).
	Sagebrush, or Artemisia (*Artemisia tridentata*).
Lower Sonoran.	Creosote-bush, or Covillea (*Covillea tridentata*).

The less conspicuous species form belts of their own, the limits of which do not always coincide with the limits of the conspicuous species. These secondary belts often overlap and form what might be termed *imbricating belts*. A good illustration of such belts is that of *Grayia spinosa*, the hop-sage, which along with its associates, *Clistoyucca brevifolia*, the Joshua-tree, and *Coleogyne ramosissima*, forms a belt overlapping the boundary between the Covillea and artemisia belts. *Covillea tridentata* and *Artemisia tridentata* rarely meet on the same level. If present in the same region, the gap between the two belts is usually 100 meters or more.

The flora of Utah and Nevada contains over 3,600 species and subspecies of vascular plants, ranging over the various belts, as shown by the subjoined table (p. 14). The figures given are only approximate, since there is always uncertainty as to the exact range of little-known species.

The geographic centers of distribution of our species are imperfectly known, for many of the specimens in herbaria bear few data beyond the name of the general region. Much detailed field work is therefore necessary, with exact geographical and altitudinal data, before we can reach a definite knowledge of plant distribution in the region. A statement "collected at 7,000 feet elevation" means little for Utah or Nevada, for in the Wasatch Mountains alone the altitudinal variation of the belts is conspicuous. On the steep western slopes the aspen, for example, descends to 1,800 meters elevation in the canyons, while on the eastern slope with its plateaus and box canyons it ranges some 300 meters higher. The yellow pine is often found at 1,500 meters, but it reaches its greatest development at 2,100 to 2,400 meters. At 2,100 meters elevation it forms dense forests, of which those about Flagstaff, Arizona, and northward on the Kaibab Plateau might be cited as good examples.

Roughly speaking, the composition of the Utah-Nevada, or Great Basin, flora is as follows:

	No. of species
1. Northern species ranging down over the basin	1142
2. Great Basin elements	495
3. Mexican plants ranging northward	667
4. Colorado or eastern species ranging westward	353
5. California (principally Sierra Nevada) plants ranging eastward	333

If the Great Basin elements are added to the Mexican plants, there is an almost exact balance of northern and southern elements in this flora.

When more definite data are at hand it may be found that many of the species now classed as northern should properly be classed with the Great Basin elements, and thus the percentage of indigenous elements in this flora may be considerably increased.

The northern plants may be divided into three classes:

1. Species ranging from Alberta or Montana southward to Colorado, Utah, and in some instances to New Mexico and Arizona.
2. Species ranging from British Columbia to California and western Nevada.
3. Species ranging from Alaska and western Canada southward along a wide front. This area divides itself into two branches, one following the Rocky Mountains, the other the Sierra Nevada.

Pinus murrayana, the lodgepole pine, is a striking example of the last class. It is absent throughout the greater portion of Utah and Nevada. It is present in the Uinta Mountains, and at Malta, Colorado, it forms dense forests. At Lake Tahoe, on the Nevada side, the writer has observed it in large numbers.

The Covillea belt occupies only a small portion of Utah and Nevada, being limited to the valleys of the Virgen and Muddy rivers, the lower course of the Colorado, and to the terraces below an

elevation of about 1,100 meters above sea level. Approximately 635 species, or nearly 16 per cent of the whole flora, range through the Covillea belt. Of these, about 230 species, or a little over 6 per cent of the whole flora of Utah and Nevada, are confined to the Covillea belt.

If we examine the list of plants given by Coville in his Death Valley report,[1] which included a large area in California, we find that about 400 species were collected in the Covillea belt within the geographical limits considered. The species enumerated in that report number 1,214, from which basis it appears that nearly 33 per cent of the flora is represented in the Covillea belt from below sea level to the uppermost terraces, this belt being therefore nearly as rich in species as the artemisia belt. If we consider the region to the south of the area treated by Coville, a large number of Mexican plants come in, and with these added elements the richness of the Covillea belt flora in its entirety will probably be found to exceed that of the artemisia belt.

The artemisia belt (sagebrush plains) of the Great Basin contains a greater number of species than any other belt of the Utah-Nevada flora, for nearly 45 per cent of the species range over it. The percentage of species ranging over the belts decreases gradually up to the alpine heights, where 7 per cent of the flora is represented. The yellow pine belt, however, forms an exception. This is due to the fact that a small portion of the Sierra Nevada is included within the borders of the State of Nevada, and the number of species in the yellow pine belt is thereby abnormally increased.

In 1858–59, Dr. Asa Gray pointed out the great resemblance of the vegetation of Japan to that of eastern North America. The meteorological conditions of the two regions are well nigh the same. A like resemblance exists between the flora of our extreme southwestern States and that of Spain, Morocco, and Algeria, and portions of Asia.

Southern Nevada, Arizona, and California have much in common with the Iberian Peninsula and North Africa, for if one travels, as the writer has done, from the extreme southern point of Spain, Tarifa, or Algeciras, northward through the peninsula and ascends the high barrier ranges on the way, he passes through a number of zones or belts ranging from the subtropical to the alpine. A like journey in our Pacific Coast and Great Basin States from the Colorado Desert to southern Utah and Nevada will lead over a similar range of similar belts.

With the exception of northern Spain and Portugal, which belong to the humid Atlantic belt, the climate of Spain is arid. Its desert

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[1] Contr. U. S. Nat. Herb. 4: 234–283. 1893.

areas, sandhills, broad river valleys, juniper hills, bare mountains, saline depressions, plains, plateaus, and magnificent sierras are duplicated, but on a much grander scale, in our Southwest. (Pls. 1 and 2.)

The littoral or palm belt of Spain, characterized by the cork oak (*Quercus suber*), date palm (*Phoenix dactylifera*), and carob (*Ceratonia siliqua*), much resembles the region dominated in our country by creosote-bush. Its counterpart in western America lies essentially south of the range of the present work, or in southern California, Arizona, and Mexico. On the other hand, the Granadan and Castilian plateaus and the mountains rising above these plateaus have much in common with the lower terraces of Utah and Nevada. (Pl. 3.) On these terraces the olive and the fig thrive as well as in their natural home about the Mediterranean.

The greater portion of Utah and Nevada lies at an elevation of 1,200 meters or more. It has a more severe climate, and while it has the aspect of portions of Spain, its counterpart in the Old World lies probably east of the Caspian Sea. Both regions are characterized by many areas without drainage to the sea, salt deserts, clay hills (pl. 4), sandy wastes, and mountain ranges (pl. 5). The greater portion of the Chenopodiaceae are perhaps the best indicators of an arid climate and a saline soil. Of this family there are a great number of species in the Great Basin and also in Spain, North Africa, and western Asia.

Rydberg records about 5,900 species of plants from the territory covered by his Flora of the Rocky Mountains, namely, western Canada southward to include Colorado and Utah. If the range of Rydberg's flora were extended to include the State of Nevada it would be necessary to increase the number of species by not more than 15 per cent at the most, or to approximately 6,785 species.

Comparing our flora with that of Europe we obtain striking results. The European flora contains about 10,000 species, and of these about 5,500, or 55 per cent, range into or over the Spanish peninsula; 53 per cent of the species of the Rocky Mountain region and Nevada are represented in Utah or Nevada. About 1,200 species of the Spanish flora (or 12 per cent of the European) are strictly indigenous, or common to Spain and the African plateau immediately to the south. If we add to the number of species confined to the Great Basin those growing exclusively within the Covillea belt within our area, the indigenous elements will show a like proportion to that given for Spain.

A number of species now firmly established in the West are immigrants from Europe. *Atriplex rosea* is one of the most striking examples of an introduced plant with the aspect of a native. For several years it passed for a native and received a new name, *Atriplex*

spatiosa. *Bassia hyssopifolia*, a recent adventive, thrives in western Nevada, where it is now invading the desert areas. *Malcolmia africana*, ranging from Spain to Turkestan and northern India, is now established and very abundant in central Utah and elsewhere.

The genus *Astragalus* is represented in our flora by about 120 species and forms. It is one of our large genera and is better represented in the Great Basin than elsewhere in North America. Piper[2] enumerates 30 species for the State of Washington. Rydberg[3] records 83 species for Colorado, and Wooton and Standley[4] 53 for New Mexico. It is one of the large genera in the Pamir region of Asia, for Paulsen[5] records about 60 species, apparently from the desert areas alone, while Boissier[6] enumerates 757 species for southwestern Asia.

Ephedra species are typical of the desert areas. This genus is represented by four species in our flora and by an equal number in Spain and Morocco. Paulsen records two for the Pamir region and Boissier 11.

The foothill vegetation of Utah and Nevada is characterized by species of *Juniperus* of the *Sabina* group, which, along with the pinyons, form a characteristic belt. In the Old World four species of that group of *Juniperus* are equally characteristic of similar areas. The higher slopes in both regions are crowned with species of spruce and fir, forming extensive forests.

In conclusion, it may be remarked that a flora of any region is the result of numberless efforts on the part of collectors whose names may never be known to the general public. Of these, tribute should be paid to that most faithful and efficient body of public servants, the Forest Service. The writer has ridden over vast areas of the West and has received unexampled courtesy from these workers and the hospitable and kindly people of Utah and Nevada, to whom the present volume is dedicated. He is greatly indebted also to Dr. Frederick V. Coville, Dr. T. H. Kearney, and Mr. Vernon Bailey for valuable suggestions, and to the following botanists for the treatment of special groups: Dr. William R. Maxon (Pteridophyta), Mrs. Agnes Chase (Poaceae), G. P. Van Eseltine (*Carex*), Dr. Frederick V. Coville (Grossulariaceae), Homer C. Skeels (Orchidaceae), W. W. Eggleston (*Lupinus*), Prof. J. B. S. Norton (Euphorbiaceae), Dr. J. N. Rose (Cactaceae), Ivan M. Johnston (*Cryptanthe*), C. R. Ball (*Salix*), and Dr. S. F. Blake (Polygalaceae, Asteraceae).

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[2] Contr. U. S. Nat. Herb. **11**: 367–374. 1906.
[3] Colo. Agr. Exp. Sta. Bull. **100**: 202–212. 1906.
[4] Contr. U. S. Nat. Herb. **19**: 357–369. 1915.
[5] Second Danish Pamir Exp. 152–153. 1912.
[6] Fl. Orient. **2**: 205–498. 1872.

TABLE I.—*Zonal distribution of species*

The table shows the number of species occurring in each belt, the number endemic to that belt, and the number ranging from one belt to another. Thus, of the species growing in the spruce belt 60 are restricted to that belt, 150 range from the alpine belt to the spruce belt, and 74 from the subalpine to the spruce belt.

	Alpine	Subalpine	Spruce	Aspen	Yellow pine	Pinyon	Artemisia	Covillea
Alpine	11							
		6						
Subalpine	34	34						
			60					
Spruce	150	150	150					
		74	74					
				22				
Aspen	57	57	57	57				
		40	40	40				
			217	217				
					102			
Yellow pine	10	10	10	10	10			
		57	57	57	57			
			213	213	213			
				81	81			
						36		
Pinyon	1	1	1	1	1	[a] 1		
		13	13	13	13	13		
			68	68	68	68		
				86	86	86		
					72	72		
							356	
Artemisia	1	1	1	1	1	1	[a] 1	
		15	15	15	15	15	15	
			171	171	171	171	171	
				121	121	121	121	
					372	372	372	
						286	286	
								229
Covillea			6	6	6	6	6	6
				11	11	11	11	11
					34	34	34	34
						67	67	67
							287	287
Total	264	458	1, 153	1, 190	1, 434	1, 360	1, 727	634

[a] Distribution probably accidental.

PLANT COMMUNITIES IN UTAH AND NEVADA

By H. L. Shantz

Within the boundaries of Utah and Nevada are found the greater number of the plant formations which characterize the western part of the United States. They range from the alpine meadows of the mountain peaks of Utah, through the various coniferous forests of the central Rockies, and the desert shrub types, to the salt desert shrub types of the lowest depressions.

The following plant formations occur, ranging from the mountain peaks to the depressions, as follows:

Alpine grassland
Spruce-fir forest
Western yellow pine forest
Pinyon-juniper woodland
Northern desert shrub
Salt desert shrub
Southern desert shrub

There are several formations which, although not of great importance in Utah and Nevada, are found there over small areas: Chaparral, usually between the juniper-pinyon and yellow pine belts; bunchgrass, usually just above the northern desert shrub in the north and at high altitudes; and shortgrass, or plains grassland, which extends into the northern desert shrub areas, especially in southeastern Utah.

Alpine grassland is limited to the areas above timber line and occurs chiefly on the Uinta and Wasatch mountain peaks. A few of the high peaks of Utah and Nevada rise above timber line. Spruce-fir forests are most abundant in northeastern Utah. Western yellow pine and Douglas-fir forests are most extensive in Utah, although they occur here and there on the higher mountains of Nevada. Pinyon-juniper woodland characterizes most of the lower mountains of Nevada and constitutes a very important vegetative feature of both States, just above the desert. Northern desert shrub is more extensive in area than any other type of vegetation, and occupies all the desert land in Utah and Nevada above the thirty-seventh parallel with the exception of the lower undrained saline areas, which are characterized by salt desert shrub. The largest continuous area of

saline, or alkali, land is in the Great Salt Lake desert west of Great Salt Lake in Utah. In southern Nevada southern desert shrub replaces northern desert shrub, the division line coming near the thirty-seventh parallel. At higher elevations northern desert shrub pushes farther south, while southern desert shrub pushes farthest north on the lower slopes that are protected to some extent from the cold air drainage of the bottoms of the valleys. There is, therefore, a dovetailing of the two formations, northern desert shrub extending farthest south along the ridges with shorter extensions in the bottoms of the valleys.

NORTHERN DESERT SHRUB

This formation, sometimes known as the sagebrush formation, is characterized by a scattered growth of deciduous shrubs, usually with small leaves of a light or silvery color. The plants are woody, often very uniform in size and general habit, and seldom exceed fifty years in age. In the denser stands they almost cover the ground; but in more typical areas they stand far apart and, except during the growth of annuals, the soil surface is prominent except when the landscape is viewed from a distance.

The rainfall is 10 to 15 inches and comes largely during the long winter rest period. On the more previous lands, such as the alluvial fans where water penetrates to great depth, the deep-rooted sagebrush occurs. Where rainfall is light or soil impervious, only wetted at the surface, other desert shrubs enter. The frost-free period is 90 to 130 days, but the growth period is usually greatly shortened by drought. The following are some of the main communities characteristic of the sagebrush formations. With each of the three main associations are grouped a number of the more important related communities. If these are true climax they are known as associations; if they merely represent developmental stages, having developed after the destruction of the climax type, and will give way to it later, they are called associes.

Sagebrush association (*Artemisia tridentata*).
Small sagebrush association (*Artemisia nova*).
Little rabbitbrush associes (*Chrysothamnus puberulus*).
Shadscale association (*Atriplex confertifolia*).
Winter-fat associes (*Eurotia lanata*).
Hop-sage and Coleogyne association (*Grayia spinosa* and *Coleogyne ramossissima*).
Bud sagebrush association (*Artemisia spinescens*).
Mat saltbush association (*Atriplex corrugata*).
Gray molly association (*Kochia vestita*).

Sagebrush association. This is the most important association of the north desert shrub. It occupies most of the higher well-drained land, free from alkali, pervious, and well supplied with water to a

depth of 4 to 18 feet (3 to 5.4 meters). It characterizes the great alluvial fans where to the rainfall are added flood waters from the adjacent mountains. The size and vigor of the plants are an expression of the favorableness of the area for crop production. The best of the dry farmland, and much of the best irrigated land, has been developed on the sagebrush lands of the alluvial fans and in the intermountain valleys. The rainfall is well distributed through the year, a large proportion of it falling during the winter rest period.

Sagebrush (pl. 6, A) often forms a pure open stand, the plants varying in height from 2 to 7 feet (0.6 to 2.1 meters). It represents a diminutive forest, in which the plants are usually not close enough to enable their crowns to touch. More often, less than half the area is covered by the crowns of the plants. During rainy periods the surface is often covered with an ephemeral growth of *Bromus tectorum*, *Erodium cicutarium*, and similar desert annuals.

Small sagebrush association (pl. 6, B). Where the soil is too rocky or shallow, where rainfall is low or run-off high, due to heavy or impervious soil, small sagebrush takes the place of sagebrush. It occurs for the most part in the more elevated portions of the sagebrush area. In appearance this type of vegetation looks less like a minature forest. Only the poor sagebrush would be confused with small sagebrush in general appearance. The plants are not so tall as sagebrush and are less silvery in color. The land is of doubtful agricultural value.

Little rabbitbrush associes. Over large areas little rabbitbrush dominates the vegetation to the exclusion of all other plants. It forms a relatively close stand of low hemispheric shrubby plants, which during much of the summer form a mass of yellow. As a rule the plants are not over one foot (30 cm.) in height, although the size varies with the available moisture supply. They occur on light land free from alkali. In fact, where sagebrush is killed by drought little rabbitbrush often takes its place, and there is evidence that during dry years these plants may replace sagebrush. Only during favorable years can sagebrush replace the rabbitbrush. Rabbitbrush is, therefore, an indicator of land less favorable for dry farming than good sagebrush land.

Shadscale association (pl. 7, A). This association probably covers more territory in Utah and Nevada than any other plant community. Great expanses occur at the lower edge of the sagebrush land and extend down to the alkali bottom land. The rainfall is less than on sagebrush land, and the soil usually heavy and relatively impervious; consequently the moisture supply is limited to the surface soil. The plants usually root only one or two feet (30 to 60 cm.) deep, and the salt content is relatively high in the deeper soils. During pro-

tracted drought periods these plants die over large areas and are replaced temporarily by matchweed (*Gutierrezia sarothrae*). Shadscale is monotonous in appearance, from uniformity of size, color, and distribution of the plants. They are usually 12 to 18 iches (30 to 45 cm.) high, hemispheric, and often match perfectly the ashy color of the soil surface. In autumn the bracts and leaves take on a reddish brown color.

This land is not suited to dry-land agriculture, but where the soil is not too heavy or shallow it can be made productive under a proper system of irrigation.

Winter-fat associes (pl. 7, B). Where shadscale has been killed, winter-fat (*Eurotia lanata*) often becomes dominant. These areas can be distinguished at great distances because of the light color of the foliage. As grazing land winter-fat is probably the best of any of the desert types of vegetation. It is especially valuable as winter feed for sheep. Agriculturally this land does not differ from shadscale land.

Hop-sage and Coleogyne association. These plants form a broad, imbricating belt between the northern and southern desert areas, and are usually mixed with southern and northern forms. As a rule the association occupies pervious light land, but land by no means suited to dry farming, since it occurs near the southern limit where the temperature is higher and the evaporation much greater than on sagebrush land. This land is free from harmful amounts of alkali.

Bud sagebrush association. In appearance these areas are somewhat like winter-fat areas, but darker in color. Great areas occur in about the same soil as shadscale. For pasturage it is very valuable, and sheep are moved from winter-fat areas to bud sagebrush areas as soon as the young shoots begin to push out. Bud sagebrush constitutes the principal feed of sheep in early spring.

Mat saltbush association (pl. 8, A; pl. 12, B). Where the rainfall is less than 10 inches (25 cm.) and the soil impervious and well filled with alkali nearly to the surface, sagebrush and shadscale are unable to grow. Such areas are marked by mat saltbush. The appearance is that of a desert, much of the ground being bare, with an occasional low mat-like plant of ashen or soil color. The plants are widely separated from each other, and the landscape shows a relatively large amount of bare soil. Growth begins in early spring and the plants pass the summer in a drought-rest condition. The moisture supply is very small except in early spring, and the high salt and low water content shut out almost all other plants. When placed under a proper system of irrigation this land can be reclaimed. It is useless for dry farming, but has some value as spring grazing land.

Gray molly association (pl. 8, B). The areas dominated by this association are not extensive. In appearance they can be distinguished with difficulty from winter-fat areas. The plants of the two are of about equal height, but gray molly is not so white as winter-fat. The soil is usually light in color and very heavy in texture. Although alkali is not noticeable at the surface, the amount is so great at a depth of 10 or 12 inches (25 to 30 cm.) that the plant roots can not develop.

SALT DESERT SHRUB (GREASEWOOD FORMATION)

The Great Basin contains many areas from which there is no drainage. Drainage water passes into these low valleys from the adjacent hills and mountains and is evaporated there, leaving behind an accumulation of soluble salts. Often there is a narrow line along the edge of drainage channels where salts have accumulated in sufficient quantities to prevent the growth of plants other than those that can endure alkali. The salts, which are usually referred to as alkali, are of two types, white and black. The principal salts that form white alkali are the chlorides and sulphates of sodium, calcium, and magnesium. These salts crystallize on the surface to form the white deposit known as white alkali. Black alkali, or sodium carbonate, is so designated because its presence is often indicated by dark coloration of the soil. Black alkali is regarded as much more harmful to vegetation than white alkali.

The salt desert shrub varies greatly in appearance, according to the type of plant which characterizes it. However, the plants are relatively bright green and somewhat fleshy, and appear more luxuriant than the equally vigorous but gray and nonsucculent plants growing in dry soils. As a rule the water supply is adequate, and in many cases the water table is only 12 to 24 inches (30 to 60 cm.) below the soil surface. The most extreme alkali areas have no vegetation of any kind, the surface being an expanse of either white salt or saline mud. Several associations may be distinguished in this formation:

Greasewood association (*Sarcobatus vermiculatus*).
Greasewood-shadscale association (*S. vermiculatus* and *Atriplex confertifolia*).
Seepweed association (*Dondia torreyana*).
Pickleweed association (*Allenrolfea occidentalis*).
Samphire association (*Salicornia utahensis* and *S rubra*).
Saltgrass associes (*Distichlis spicata*).
Alkali sacaton associes (*Sporobolus airoides*).
Rabbitbrush associes (*Chrysothamnus graveolens*).

Greasewood association (pl. 9, A). In this association the plants are usually evenly spaced, 4 to 7 feet (1.2 to 2.1 meters) apart, and range from 2 to 5 feet (0.6 to 1.5 meters) in height. They are green during the growth period, and when in full leaf or fruit present a luxuriant appearance, contrasting sharply with the gray of shadscale or the silvery gray of sagebrush. Land of this type contains harmful amounts of salt, and usually has a high water table during at least a part of the year.

Greasewood-shadscale association (pl. 9, B). At somewhat higher elevation this type of vegetation forms an extensive zone between northern desert shrub and salt desert shrub. The plants have very different requirements, *Sarcobatus* requiring much more moisture, while *Atriplex* can succeed only in a relatively dry soil. The two plants contrast sharply, shadscale being ashen in color and low and hemispheric in shape, while greasewood plants are tall and are bright green during the growing season. This association indicates a soil that contains alkali in the second or third foot and in which ground water when present is limited to the deeper soil, being thus unavailable to any great extent to shadscale, but available at least during a part of the year to the deeper-rooted greasewood. Agriculturally, land occupied by this association is somewhat superior to that of pure greasewood, since it is more easily drained.

Seepweed association. Although seepweed, *Dondia torreyana*, becomes a prominent plant in saline areas in California and Arizona, it seldom occupies large areas to the exclusion of other plants in Utah and Nevada. It is often mixed with greasewood, and indicates a somewhat higher salt content than is found in the pure greasewood areas.

Pickleweed association (pl. 10, A). This association is found only on the level low expanses of moist saline soil. It often characterizes hummocks on these salt flats, but in other cases has an even distribution with a relatively close cover. The soil is moist throughout the growing period, and contains over 1 per cent of salt, an amount sufficient to shut out all but the most alkali-resistant plants. The plants in Utah and Nevada are usually small, seldom over two or three feet in height, dark green, and very succulent. Over much of the surface salt incrustations may be seen, giving the soil an almost snow-like appearance. The largest areas occur near Great Salt Lake, but most of the alkali flats of Nevada and other portions of Utah are characterized by this type of vegetation.

Samphire association (pl. 10, B). Here the salt content is extremely high, usually up to 2.5 per cent, and the ground water comes almost to the surface of the soil. The conditions are the most extreme encountered under any type of vegetation in the salt desert shrub. In the region about Great Salt Lake, where this association

is widely distributed, it is composed of Utah samphire (*Salicornia utahensis*), a perennial, and western samphire (*Salicornia rubra*), an annual. The annual species is apparently greatly favored by a precipitation which has a tendency to leach slightly the surface soil, and germination is usually best along the drainage channels. The perennial species occurs on scattered hummocks, or it may form a pure even stand. The appearance of the two species is very distinct, *Salicornia rubra* being bushlike, 2 to 6 inches (5 to 15 cm.) high, and turning very red toward the end of the growing season, while *S. utahensis* consists of unbranched fleshy stems 4 to 6 inches (10 to 15 cm.) high, which remain green.

Saltgrass associes. Alkali flats which receive at some time during the year a considerable amount of fresh water as flood water usually develop a turf of saltgrass. The surface may be evenly covered with a dense sod or the growth may be very sparse, consisting of rows of plants shooting up from underground rootstocks. This land is valuable principally for grazing. The salt content is usually relatively high, about 1 per cent.

Alkali sacaton associes. Where conditions are a little more favorable than on saltgrass lands alkali sacaton, though usually growing as a bunchgrass, often forms a close sod. This grass is well liked by rabbits and is prized by horses and cattle. Areas of this grass probably constitute the best grazing land in the salt desert region.

Rabbitbrush associes. Rabbitbrush is often scattered over saltgrass or alkali sacaton sod, and in some places becomes so dense that only the bushes are evident. This yellow-flowered shrub stands 2 to 3 feet (60 to 90 cm.) high, grows very rapidly, and is short-lived. It characterizes a soil with a relatively low alkali content, usually not over 0.3 per cent.

SOUTHERN DESERT SHRUB

This type of vegetation, sometimes called the creosote-bush formation, occurs in southwestern Utah, where it reaches its northern limit at or near St. George. In Nevada it occupies the low warm valleys south of the thirty-seventh parallel, and is found in its typical phases in the southern end of the State. It differs from the northern desert shrub largely in that there are within its borders a larger number of yucca and cactus forms. It is also characterized by the deep green of *Covillea*, which contrasts sharply with the ashen gray shrubs of the northern desert. There are in the southern desert, however, such plants as *Atriplex* and *Franseria*, which might, on the basis of general appearance, belong to either northern or southern desert. One species of *Atriplex*, *A. canescens*, seems equally at home in either desert. The temperature of this southern desert is high, often rising to 120° F. Over much of the area it

rarely falls below 20 to 25° F. The frost-free period is long, more than 190 days. Because of intense heat and very rapid evaporation, the conditions for plant growth are much more extreme in this desert than in the northern desert. In many parts of the area, however, the wide spacing of the plants and the pervious nature of the soil combine to supply a quantity of available water sufficient to enable these desert shrubs to continue growing through the extremely long periods of drought, which sometimes last a year or more. Over much of the area the rainfall is meager, ranging as low as 2 inches per year, although in Nevada this type of vegetation usually occurs on land with rainfall between 5 and 10 inches. The following are the principal associations found in southern Nevada:

Desert saltbush association (*Atriplex polycarpa*).
Creosote-bush association (*Covillea tridentata*).
Creosote-bush and bur-sage association (*C. tridentata* and *Franseria dumosa*).
Joshua-tree association (*Clistoyucca brevifolia, Grayia spinosa*, and *Coleogyne ramosissima*).

Desert saltbush association (pl. 11, A). In southern Nevada desert saltbush is often referred to as desert sage. It is characterized by uniform gray stands, and somewhat resembles the sagebrush of the northern desert shrub. It occurs usually where flood water constitutes a considerable part of the annual moisture supply, and, if this be sufficient, forms dense thickets, the plants being 3 to 4 feet (90 to 120 cm.) high. The soil is usually a fine loam, and these thickets mark the best agricultural land of this southern desert region. On poorer land, or land which receives only the normal rainfall, the moisture is insufficient to produce a dense stand, and the plants are scattered, often only 2 to 3 feet high, and very widely spaced. Desert saltbush is limited to the valleys, where it occurs just above the salt desert shrub; it does not occupy land which is subirrigated. Often where there is sufficient moisture supply at greater depth, there are scattered through the desert saltbush areas occasional trees of mesquite.

Creosote-bush association (pl. 11, B). This association is most characteristic of the southern desert, and more extensive than any other type of vegetation. It is found for the most part at a greater elevation than the desert saltbush and below the yucca-cactus zone. In southern Nevada it occupies the great alluvial fans, where the soil is pervious and moistened by either rainfall or flood water to a considerable depth. The plants are widely spaced, often varying in their spacing from a few feet to 100 feet or more. During normal years they continue without loss of foliage through practically the whole season.

With respect to soil and alkali conditions, Covillea land is similar to the sagebrush land of the northern desert in that it is moistened to considerable depths and is free from harmful amounts of salt.

Creosote-bush and bur-sage association. At the upper edge of the creosote-bush zone bur-sage becomes a prominent feature, and this mixture is often so wide and extensive that it is recognized as a separate association. The dark green, lacquered leaves of the creosote-bush contrast sharply with the low, light gray bur-sage bushes. This association leads from the pure Covillea to the yucca belt above.

Joshua-tree association (pl. 12, A). On the mountain slopes at somewhat higher elevation in southern Nevada along the thirty-seventh parallel and southward there are forests of tree yucca, the Joshua-tree, which are most picturesque. The trees commonly vary from 5 to 15 feet (1.5 to 4.5 meters) in height and often are so dense that at a distance they look like a forest. As a rule the interspaces are occupied by plants characteristic of both the southern and the northern desert; chiefly, however, by *Coleogyne*, and to a lesser extent by *Grayia*. This association is characteristic of light pervious soil, and areas so covered would probably be dominated by Covillea, were it not for the unfavorable temperature conditions.

THE FOOTHILL-MONTANE-ALPINE FLORA AND ITS ENVIRONMENT

By ARTHUR W. SAMPSON

That the character of the flora is determined by the conditions of the environment is shown conspicuously in the diversity of the vegetation from the foothills to the alpine heights. The relief features peculiar to Nevada and Utah, from valley and desert to elevated plateau and alpine mesa, rising to or indeed above timber line, serve to intensify the climatic differences. Quite as great a contrast is found in the different life zones, in such important growth factors as air and soil temperatures, length of growing season, wind movement, the evaporating power of the air, and precipitation, as in the mantle of vegetation itself. For instance, when the growing season is measured from the time of the last spring frost to the first killing autumn frost, it is seldom in excess of 90 days in the arctic-alpine region, yet it is seldom less than 180 days in the foothills. Thus, in passing from the foothills to the alpine heights the wide variation in climate is seen to girdle, as it were, the mountains with belts of vegetation. Yet within certain altitudinal limits the vegetation is strikingly similar and comparatively uniform in phenological activities. The limitations of the most characteristic vegetational belts are approximately as follows:

Pinyon-juniper	5,000– 6,500 feet (1,500–1,950 meters).
Yellow pine and oak brush	6,200– 7,600 feet (1,860–2,280 meters).
Aspen-fir	7,400– 9,500 feet (2,200–2,850 meters).
Spruce-fir	9,000–11,000 feet (2,700–3,300 meters).
Arctic-alpine	Above timber line.

CLIMATIC CHARACTERISTICS OF THE PLANT BELTS

A study of the climatic characteristics of the different life zones or belts has proven instructive. Intensive investigation in this field was carried out in the Wasatch Mountains at the Great Basin Experiment Station in central Utah.[7]

PRECIPITATION

There is considerable variation from year to year in both the monthly and annual precipitation in the different mountain life

[7] Sampson, Arthur W., Climate and plant growth in certain vegetative associations. U. S. Dept. Agr. Bull. 700. 1918.

belts. This variation is not uncommonly as great as 300 to 400 per cent. A relatively light rainfall in June, with an appreciable increase in July and August, is characteristic. (Fig. 2.) Indeed, the average monthly precipitation from 1914 to 1920, inclusive, is lighter in June than for any other month, the average being 0.52 inch (13 mm.), 0.71 inch (17+mm.), and 0.71 inch for the yellow pine, aspen-fir, and spruce-fir belts, respectively.

It is interesting to note that the highest average monthly precipitation for the period 1914 to 1920, inclusive, is in the aspen-fir belt,

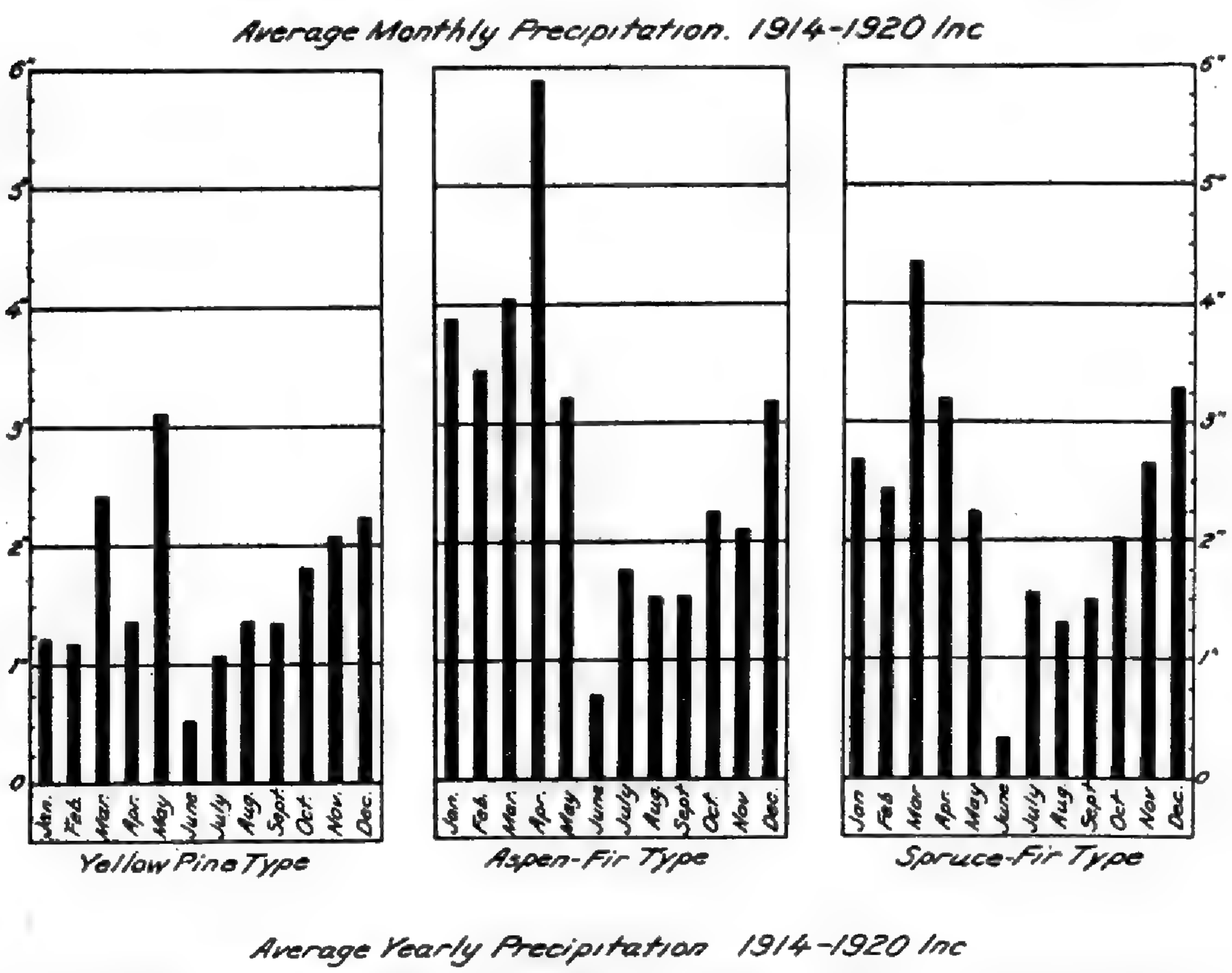


FIG. 2.—Precipitation charts of Utah

the spruce-fir belt being a close second in this respect. In the yellow pine and oak brush belt the precipitation is comparatively lower, the average monthly figures being 1.52 inches (38 mm.), 2.44 inches (61 mm.), and 2.16 inches (54 mm.) for the yellow pine, aspen-fir, and spruce belts, in the order named.

As the foregoing data would indicate, the aspen-fir belt receives also the largest annual precipitation; the spruce-fir belt ranks a relatively close second; while the yellow pine and oak brush belt receives appreciably less than do the two higher ones. For the seven years ending in 1920 the average annual precipitation was 18.2

inches (45.5 cm.), 29.3 inches (73 cm.), and 25.9 inches (65 cm.) in the yellow pine, aspen fir, and spruce-fir belts, respectively.

Considering the belts as a whole, there is a rather sharp diminution in the precipitation from May to August, inclusive; that is, during the main growing season. The period from December to April, inclusive, or the dormant season, on the other hand, shows a considerably higher average precipitation than that received during the other months of the year. In view of the devastating effects of erosion on the more exposed, elevated, and in many cases poorly vegetated areas, particularly in the spruce-fir belt, it is probably fortunate that an excessive amount of precipitation is not received from May to September, for during that time the precipitation is usually in the form of rain. An erosion study conducted on two selected areas of 10 acres each, located in the spruce-fir belt, shows clearly the wide variation in rainfall at different times during the growing season. On the steeper of the two erosion plots selected, with an average of about 17 per cent slope, as little as 0.07 inch (1.7 mm.) of rain sometimes caused a deposit of water and sediment in the settling tank situated in the lower part of the area. Ordinarily, however, not less than 0.15 inch (3.8 mm.) of rainfall was required for a deposit of earth in the tank, but such an amount must be received in a short time. In several instances violent rainstorms recorded between 1914 and 1921 have resulted in a deposit of more than 100,000 pounds of air-dry soil and gravel from the ten-acre area.

TEMPERATURE

Throughout the year the mean temperature is appreciably lower in the arctic-alpine belt and highest in the pinyon-cedar belt. The monthly range in temperature, however, is much the greatest in the lowest belt and lowest in the most elevated belt.

The actual difference in the heat units received in the yellow pine, aspen-fir, and spruce-fir belts, respectively, from June to September, may best be expressed in the number of hours of temperature above 40° F., the temperature at which growth may take place. During the main growing period the average monthly hours above 40° F. in the oak brush, aspen-fir, and spruce-fir belts are 369, 315, and 215, respectively. In other words, there is a gradual diminution in a given period for the number of hours above freezing, as the elevation increases. It is interesting to note in this connection that for each month in the year, taking the average of all years observed, there are at least a few hours during which the temperature is below 40° F. The lowest number of hours of non-growing temperature, that is, below 40° F., are recorded in July and August in each belt, June and September closely following in this respect. It is interest-

ing also that July and August are the only months in the year that have no hours of freezing temperature. The greatest number of hours above 40° F. in each zone occurs in July.

WIND MOVEMENT

The wind movement in the aspen-fir belt is approximately 12,500 miles (nearly 21,000 km.) from June to September, inclusive, whereas in the spruce-fir belt it is about 25,700 miles (nearly 42,830 km.) In other words, during the growing season the wind movement is approximately 100 per cent greater on nonwooded lands in the spruce-fir belt than in similar situations in the aspen-fir belt about 1,500 feet (450 meters) lower. Not infrequently the wind movement in the spruce-fir belt develops into gales, and has a profound effect on sparsely vegetated plateaus in drying out and eroding the soil.

It would appear that the greatest wind movement occurs in June. During the three following months the records show a rather striking diminution in wind movement.

EVAPORATION

The highest evaporation occurs each month throughout the growing season in the pinyon-juniper belt. From this belt upward there is a gradual diminution in the evaporation up to the spruce-fir belt. There, because of the vast stretches of low-growing herbaceous vegetation, the effect of the greater wind movement is greatly intensified and the evaporating power of the air is more intense than in the aspen-fir belt immediately below. While the high evaporation in the pinyon-juniper belt is due chiefly to high temperature and relatively low humidity, in the spruce-fir belt it is accounted for essentially by high wind velocity.

Throughout the greater part of Utah and Nevada there is little land suited to agricultural crops in the yellow pine belt, or above an elevation of approximately 8,000 feet (2,450 meters). This is due chiefly to low temperatures, but also to the fact that topographic conditions are not favorable.

INDICATOR PLANTS OF VEGETATIVE BELTS

PINYON-JUNIPER BELT

The vegetation in this belt shows clearly that the small precipitation is one of the important factors limiting growth.

Pinyon (*Pinus edulis; P. monophylla* in Nevada) and two junipers (*Juniperus utahensis* and *J. scopulorum*) (pl. 13; 14, A) form the woodland belt which everywhere occurs in scattered stands be-

tween the desert below and the true forest of the yellow pine belt above.

Second to limited precipitation, shallowness of soil is a factor which limits the density of the vegetative stand and its luxuriance of growth. Both precipitation and depth and fertility of the soil increase as one goes to higher altitudes.

The first appearance of the forest scrub or pinyon-juniper belt is at an elevation of approximately 5,000 feet (1,500 meters). It is here that the first stragglers of juniper are encountered. At a little higher elevation, especially on northerly and westerly slopes, the junipers grow more luxuriantly and occur in greater stand. Good development is attained at an elevation of about 5,500 feet (1,650 meters). A little higher the pinyon reaches its maximum development. Near the upper limits of the pinyon-juniper cover these characteristic trees become less abundant but of good size, with occasionally a dwarfed struggling specimen of yellow pine (*Pinus brachyptera*).

The flora of the pinyon belt is a reduced artemisia belt flora.

That limited moisture, rather than excessive heat units or inferior soil, is responsible for the limited growth of plants of this belt is made clear from the fact that all species which occur along watercourses grow more luxuriantly.

YELLOW PINE AND OAK BRUSH BELT

This belt, known also as the transition zone, embraces a number of coniferous tree species, the most characteristic and conspicuous being yellow pine (*Pinus brachyptera*). In some localities the yellow pine gives way in part or entirely to Gambel oak (*Quercus gambelii*). In the upper limits of the belt yellow pine is supplanted by Douglas-fir (*Pseudotsuga mucronata*) and aspen (*Populus aurea*). In general, the timber is open and the understory consists of a mixture of herbs and shrubs, a large proportion of which are palatable to stock early in the season.

As compared with the pinyon-juniper belt below, or the aspen-fir belt immediately above, the yellow pine belt is intermediate in moisture supply, temperature, and other factors controlling growth and reproduction. In general, the soil is deeper and more productive than in the belt below, and the growing season is approximately two weeks shorter.

The most characteristic and abundant shrubs are antelope-brush (*Purshia tridentata*), squaw-apple (*Peraphyllum ramosissimum*), and shadblow (*Amelanchier alnifolia*). Interspersed with these is a stand of varying density consisting of sagebrush (*Artemisia tridentata*), Fendler rose (*Rosa fendleri*), and rabbitbrush (*Chryso-*

Rhamnus nauseosus). The most characteristic and abundant herbaceous species are slender wheatgrass (*Agropyron tenerum*), Rocky Mountain wheatgrass (*A. riparium*), bunch wheatgrass (*A. spicatum*), Fendler bluegrass (*Poa fendleriana*), nodding bluegrass (*P. reflexa*), Junegrass (*Koeleria cristata*), and Letterman needlegrass (*Stipa lettermannii*). In addition, the following species add considerably to the undergrowth: Whiteflowering raspberry (*Rubus parviflorus*), bearberry (*Arctostaphylos uva-ursi*), snowbrush (*Ceanothus velutinus*), Fendler ceanothus (*C. fendleri*), bracken (*Pteridium aquilinum pubescens*), needle-and-thread grass (*Stipa comata*), Indian-balsam (*Leptotaenia multifida*), hawksbeard (*Crepis* spp.), butterweed (*Senecio triangularis*), bluebells (*Mertensia* spp.), geranium, and prairie-mallow (*Sidalcea* spp.).

In forage production the yellow pine and oak brush belt is superior to that of the pinyon-juniper cover, both in terms of carrying capacity and in palatability of the vegetation to forage animals. While the pinyon-juniper belt is used rather extensively for winter grazing and as ground for early spring lambing, the yellow pine belt is of great value for moderately early spring grazing and to a limited extent for lambing purposes.

ASPEN-FIR BELT

Of the type trees, Douglas-fir (*Pseudotsuga mucronata*) occupies the more protected areas. Aspen (*Populus aurea*) occupies the better soils, particularly those containing an ample supply of moisture. (Pl. 15.) This tree being less tolerant than the conifers, it frequently gives way to the latter. Lodgepole pine (*Pinus murrayana*) is found only in the Uinta Mountains and the Sierra Nevada, where it often occupies sites which are rather too severe for the best growth of Douglas fir and aspen.

Only the most tolerant shrubs and herbs can endure in the subdued light under the heavy timber cover, particularly the denser lodgepole pine stands. Accordingly these areas are of little value for grazing. Where aspen predominates, on the other hand, a luxuriant admixture of grasses and broad-leaved herbs is found. This belt is probably the most valuable of any of the timbered areas for the forage which it produces. Limber pine (*Pinus flexilis*) occurs in scattered stand in association with Douglas fir throughout the range of the latter.

Among the shrubs, snowberry (*Symphoricarpos oreophilus*) is the most conspicuous. In the lower half of the belt shadblow (*Amelanchier alnifolia*) occurs in abundance and is often associated with chokecherry (*Prunus melanocarpa*). Other typical plants of this belt are:

Shrubs

Rosa fendleri.
Salix (several species).
Sambucus melanocarpa.
Sambucus microbotrys.
Sorbus scopulina.

Herbs

Achillea lanulosa.
Agropyron riparium.
Agropyron tenerum.
Agrostis exarata.
Aquilegia caerulea albiflora.
Bromus marginatus.
Bromus richardsonii.
Bromus tectorum.
Castilleja rhexifolia.
Elymus glaucus.
Fragaria bracteata.
Galium boreale.
Geranium richardsonii.
Geranium viscosissimum.
Heracleum lanatum.
Lathyrus leucanthus.
Poa fendleri.
Poa reflexa.
Rudbeckia occidentalis.
Stipa lettermanii.
Thalictrum fendleri.
Vagnera amplexicaulis.
Vicia americana.

SPRUCE-FIR BELT

This belt, in contrast with the vegetation in the belt immediately below, is open in character, the timber growing sparingly or in clumps. Grasses intermixed with various other herbaceous plants usually form the predominating vegetation.

The trees, most of which extend to the normal timber line, are subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmanni*), and in northern Utah an occasional specimen of whitebark pine (*Pinus albicaulis*). (Pl. 14, B.) The heaviest timber stands are produced by Engelmann spruce.

This belt probably covers as large an area as the two lower belts combined, and from the viewpoint of grazing it is superior to the two immediately below. Because of the heavy grazing demands, the ranges of this belt have suffered considerable depletion almost everywhere.

The most characteristic herbaceous plants are:

Agropyron dasystachyum.
Agropyron scribneri.
Agropyron smithii.
Agropyron violaceum.
Agrostis sp.
Aira caespitosa.
Hordeum nodosum.
Muhlenbergia racemosa.
Panicularia nervata.
Phleum alpinum.
Poa nevadensis.
Poa olneyi.
Poa reflexa.
Stipa minor.
Stipa nelsonii.
Trisetum spicatum.

Other characteristic plants are:

Achillea lanulosa.
Agastache urticifolia.
Delphinium barbeyi.
Delphinium menziesii.
Grossularia inermis.
Mertensia sampsonii.
Ribes cereum.
Salix (several species).
Sambucus microbotrys.
Senecio columbianus.

ARCTIC-ALPINE BELT

This belt, known also as the "timberless zone," is not only unfavorable to the growth of trees, but to range forage plants as well. It is confined to the very highest crests and peaks, where the soil is shallow and poorly decomposed, the growing season is short, and nightly frosts are likely to occur. Only a comparatively small acreage is found in the arctic-alpine belt.

Among the common species may be mentioned:

Draba oligosperma.
Eriogonum neglectum.
Hulsea nana.
Ivesia gordonii.
Phacelia alpina.

Growth does not usually begin until well into July, and it ceases for the season about September 1. Naturally, in this belt any species which succeeds in maturing viable seed must grow vigorously and be able to complete its cycle of growth in a short time.

SYSTEMATIC TREATMENT OF THE VASCULAR PLANTS

KEY TO THE FAMILIES

KEY TO THE LARGER GROUPS AND TO SOME OF THE ANOMALOUS FAMILIES.

Plant body floating, disklike or elongate, bearing one or more rootlets.
18. LEMNACEAE (p. 110).

Plants terrestrial or aquatic, rooting in soil or parasitic on other plants; if floating, the plant body not disklike.

Plant body beset with spine or bristle-bearing areolae; succulent perennials, the leaves wanting or minute——————**87. CACTACEAE** (p. 364).

Plant body not beset with bristle-bearing areolae; leaves present except in a few genera.

Plants parasitic on the stems and branches of other plants.

Stems filiform, twining, herbaceous——**106. CUSCUTACEAE** (p. 423).

Stems rigid, branching, woody——————**33. LORANTHACEAE** (p. 142).

Plants not parasitic or, if parasitic, root parasites.

Leaves reduced to sheaths at the nodes.

Plants herbs with jointed stems, with or without branches; plants without true flowers——————**5. EQUISETACEAE** (p. 50).

Plants desert shrubs with true flowers——**8. GNETACEAE** (p. 56).

Leaves not reduced to nodal sheaths, sometimes scalelike or wanting.

Plants without true flowers, spore-bearing; herbs.
PTERIDOPHYTA (p. 43).

Plants with true flowers, these often inconspicuous; herbs, shrubs, or trees.

Plants with tendrils.

Leaves pinnate——————**64. FABACEAE** (p. 288).

Leaves simple or lobed.

Stems woody——————**78. VITACEAE** (p. 351).

Stems herbaceous——————**125. CUCURBITACEAE** (p. 518).

Plants without tendrils.

Leaves, needle-like or scalelike.

Succulent herbs or low shrubs. Flowers in axillary glomerules.
36. CHENOPODIACEAE (p. 164).

Tall shrubs or trees.

Trunks mostly excurrent; flowers monoecious or dioecious, in aments——————**7. PINACEAE** (p. 52).

Trunks deliquescent; flowers perfect, in dense racemes or spikes——————**83. TAMARICACEAE** (p. 358).

Leaves various, simple to compound.

Parasites or epiphytes destitute of green foliage.

Flowers irregular, consisting of 3 sepals and 3 petals; stamen 1——————**Corallorrhiza** (p. 131).

Flowers regular, with a 5-merous perianth.

Corolla regular, the petals distinct or united.
95. MONOTROPACEAE (p. 405).

Corolla irregular, gamopetalous.
117. OROBANCHACEAE (p. 509).

Plants not parasitic or if parasitic greenish.
Leaves prevailingly parallel-ribbed except in *Trillium;* flowers inconspicuous or showy, mostly 3-merous or 6-merous (in a few cases 4-merous)____**MONOCOTYLEDONES** (p. 33).
Leaves prevailingly netted-veined; flowers usually 4-merous or 5-merous_____**DICOTYLEDONES** (p. 34).

ANGIOSPERMAE

Herbs, shrubs, or trees; leaves of many types; flowers perfect, monoecious, or dioecious; ovules enclosed in an ovary of one to many folded or united carpels.

Cotyledon one; stem endogenous; leaves mostly parallel-veined.
MONOCOTYLEDONES.

Cotyledons two; stem exogenous; leaves mostly net-veined.
DICOTYLEDONES (p. 34).

MONOCOTYLEDONES

Plant body a flat rounded minute disk; leaves wanting; plants floating.
18. LEMNACEAE (p. 110).

Plant body differentiated into stem and leaves, the latter sometimes scalelike; plants with few exceptions attached to the soil by roots.
Plants immersed aquatics; stems slender, flaccid, elongated.
Leaves alternate (of two forms in *Potamogeton*); flowers without a perianth, disposed in axillary spikes or clusters.
11. POTAMOGETONACEAE (p. 57).
Leaves opposite or whorled; flowers monoecious or dioecious, mostly solitary, axillary.
Leaves entire, filiform. Stipules membranous.
11. POTAMOGETONACEAE (p. 57).
Leaves toothed or serrulate.
Leaves sheathing at base, filiform to broadly linear.
12. NAJADACEAE (p. 60).
Leaves not sheathing at base, oblong to linear.
15. VALLISNERIACEAE (p. 61).
Plants terrestrial or growing in marshes; stems not flaccid, sometimes wanting.
Perianth none, or if present composed of bristles or scales.
Flowers in the axils of chaffy imbricated bracts (glumes).
Stems mostly hollow, terete or flattened, jointed, with solid nodes; leaves 2-ranked; fruit a caryopsis enclosed in 2 bracts.
16. POACEAE (p. 61).
Stems pithy, often 3-sided, not distinctly jointed; leaves 3-ranked; fruit an achene, subtended by 1 bractlet.
17. CYPERACEAE (p. 98).
Flowers not in the axils of chaffy bracts (glumes), monoecious or dioecious. Robust marsh plants with long-linear leaves.
Flowers in dense cylindric spikes 10 cm. long or more, the staminate spike above the pistillate_____**9. TYPHACEAE** (p. 57).
Flowers in globose heads, the staminate on the upper branches of the plant_____**10. SPARGANIACEAE** (p. 57).

Perianth present, composed of free or more or less united sepals and petals.
Ovary wholly or partly inferior.
Flowers irregular, perfect; stamens 1 or 2. Perennials with corms or tuberoid roots, or saprophytes with scalelike leaves.
24. ORCHIDACEAE (p. 129).
Flowers regular; stamens 3 or 6.
Stamens 6; leaves crowded at base of plant, fleshy, spine-toothed (in our species); perianth segments similar, often united into a tube ---------- **22. AMARYLLIDACEAE** (p. 127).
Stamens 3; leaves grasslike, 2-ranked, entire; perianth segments dissimilar, distinct or united below--**23. IRIDACEAE** (p. 128).
Ovary superior.
Gynoecium of 3 or more distinct carpels, or with united carpels and plumose stigmas. Scapose marsh plants.
Flowers small, racemose------**13. SCHEUCHZERIACEAE** (p. 60).
Flowers in elongate racemes or panicles, if racemose large, monoecious---------- **14. ALISMACEAE** (p. 60).
Gynoecium of united carpels.
Plants rushes or rushlike. Perianth small, greenish or purplish.
20. JUNCACEAE (p. 111).
Plants not rushlike.
Stamens dissimilar or only 3 with fertile anthers. Stems jointed, leafy; leaves sheathing, narrow.
19. COMMELINACEAE (p. 111).
Stamens similar, all fertile. Herbs, shrubby perennials, or small trees---------- **21. LILIACEAE** (p. 116).

DICOTYLEDONES

Flowers in a head, on a receptacle, surrounded by an involucre. Ovary inferior.
Stamens 2 to 4, inserted on the corolla tube and alternate with the lobes, the anthers versatile. Leaves opposite------**124. DIPSACACEAE** (p. 518).
Stamens mostly united by their anthers------**128. ASTERACEAE** (p. 521).
Flowers variously disposed, often capitate but not on a receptacle surrounded by an involucre (except in Polygonaceae, which have a superior ovary).
Plants trees or shrubs.
Leaves opposite or verticillate---------- **A** (p. 34).
Leaves alternate or fascicled---------- **B** (p. 35).
Plants herbs or woody perennials.
Plants aquatic, wholly or partly immersed (see also next section).
C (p. 37).
Plants terrestrial, but often inhabiting wet places.
Flowers subtended by a petaloid involucre.
Involucre of 5 to 8 oblong bracts------**25. SAURURACEAE** (p. 131).
Involucre small, 4 or 5-lobed--------**71. EUPHORBIACEAE** (p. 341).
Flowers not subtended by a petaloid involucre.
Plants twining or climbing on other plants---------- **D** (p. 38).
Plants not twining or climbing, often prostrate and rooting at the nodes ---------- **E** (p. 38).

A. Trees or shrubs with opposite or verticillate leaves.

Leaves compound or dissected.
Leaves conspicuously glandular-punctate.
67. ZYGOPHYLLACEAE (p. 339).

Leaves inconspicuously or not at all glandular-punctuate.
Leaflets mostly entire or finely toothed_____100. **OLEACEAE** (p. 412).
Leaflets toothed, lobed, or incised.
Leaflets 3 to 5, lobed or incised_____76. **ACERACEAE** (p. 348).
Leaflets commonly 7 or more, toothed, the leaves once or twice pinnate_____**Sambucus** (p. 514).
Leaves simple.
Leaves 3 to 5-ribbed, lobed or toothed_____76. **ACERACEAE** (p. 348).
Leaves pinnately veined, if 3 to 5-ribbed entire or nearly so.
Leaves densely tomentose_____**Buddleia** (p. 414).
Leaves at most tomentose only beneath.
Leaves more or less lepidote or stellate-pubescent.
88. **ELAEAGNACEAE** (p. 369).
Leaves not lepidote, often glandular-punctate.
Petiole with conspicuously swollen base____100. **OLEACEAE** (p. 412).
Petioles not conspicuously swollen at base.
Leaves linear, 10 to 15 cm. long_____**Chilopsis** (p. 508).
Leaves of a broader and shorter type.
Flowers borne in a gamophyllous involucre.
35. **POLYGONACEAE** (p. 143).
Flowers not borne in a gamophyllous involucre.
Ovary superior.
Flowers small, regular; mountain shrubs.
75. **CELASTRACEAE** (p. 347).
Flowers irregular; desert shrubs with divaricate branches and punctate leaves _____113. **MENTHACEAE** (p. 475).
Ovary wholly or partly inferior.
Stamens 20 or more.
Petals large, white; fruit a 3 to 5-valved capsule.
56. **HYDRANGEACEAE** (p. 258).
Petals large, red; fruit a many-seeded pomelike berry.
Punica (p. 371).
Stamens 10 or fewer.
Petals distinct.
Stamens opposite the petals.
77. **RHAMNACEAE** (p. 349).
Stamens opposite the sepals___93. **CORNACEAE** (p. 403).
Petals united (at least below).
Stamens free from the corolla.
96. **ERICACEAE** (p. 406).
Stamens adnate to the corolla.
121. **CAPRIFOLIACEAE** (p. 513).

B. Trees and shrubs with alternate or fascicled leaves.

Shrub with spinescent virgate stems. Leaves caducous, simple; flowers showy; desert shrub of the Covillea belt.
84. **FOUQUIERIACEAE** (p. 358).
Shrubs or trees with armed or unarmed branches, if shrubs the stems not virgate.
Bark with secreting glands.
Leaves simple; shrub spiny_____63. **KRAMERIACEAE** (p. 288).
Leaves simple or 3-foliolate; shrubs not spiny__68. **RUTACEAE** (p. 339).

Bark without secreting glands.
Leaves bipinnatifid or bipinnate.
Secondary leaflets ample, glossy; introduced tree.
69. MELIACEAE (p. 340).
Secondary leaflets small; native or introduced plants.
Plant a tree with simple or branched thorns_____**Gleditsia** (p. 287).
Plants shrubs.
Shrub more or less spiny; flowers in axillary pedunculate heads or spikes_____**61. MIMOSACEAE** (p. 286).
Shrubs not spiny; flowers white, paniculate.
Chamaebatiaria (p. 266).

Leaves simple to pinnate.
Leaves pinnate.
Leaflets ample, spinulose-toothed____**46. BERBERIDACEAE** (p. 215).
Leaflets not spinulose-toothed.
Stipules spinelike; flowers papilionaceous_____**Robinia** (p. 307).
Stipules foliaceous or none; flowers regular.
Stipules none; flowers monoecious or dioecious. Fruit a drupe.
74. ANACARDIACEAE (p. 346).
Stipules present; flowers perfect.
Bark smooth; branches unarmed_____**Sorbus** (p. 284).
Bark shreddy, or stems armed with bristles or spines.
58. ROSACEAE (p. 263).

Leaves simple.
Leaves linear, 10 to 15 cm. long_____**Chilopsis** (p. 508).
Leaves not linear.
Leaves 2-ranked, the base oblique_____**29. ULMACEAE** (p. 139).
Leaves with a more or less symmetric base.
Leaves spinulose, palmately parted_____**Leptodactylon** (p. 430).
Leaves not spinulose.
Leaves reniform, large, entire. Flowers seemingly papilionaceous _____**Cercis** (p. 287).

Leaves not reniform.
Flowers borne in a gamophyllous involucre.
Eriogonum (p. 140).
Flowers not borne in a gamophyllous involucre.
Stipules persistent.
Stamens 5. Leaves mostly palmately 3 to 5-lobed.
57. GROSSULARIACEAE (p. 260).
Stamens numerous.
Carpels distinct_____**58. ROSACEAE** (p. 263).
Carpels united and adnate to the hypanthium.
59. MALACEAE (p. 282).
Stipules caducous or none.
Leaves straight-veined or nearly so, sharply serrate or doubly serrate. Lateral veins ending in a point.
27. BETULACEAE (p. 137).
Leaves not straight-veined, the lateral ribs more or less curved.
Bud scale 1 (in *Salix*) or, if several, trees with leaves 3-ribbed at base (*Populus angustifolia* excepted).
Flowers dioecious_____**26. SALICACEAE** (p. 131)

Bud scales several.
Plants spine-armed.
Plant a tree with stout axillary spines.
Toxylon (p. 140).

Plants shrubs.
Plants tall shrubs, if low the leaves mealy.
36. CHENOPODIACEAE (p. 164).

Plants undershrubs. Flowers irregular.
Fruit echinate, 1-seeded.
63. KRAMERIACEAE (p. 288).

Fruit a capsule, not echinate.
70. POLYGALACEAE (p. 340).

Plants not spine-armed (the leaves excepted).
Leaves thin, broadly ovate to palmately lobed.
31. MORACEAE (p. 140).

Leaves not palmately lobed, if ovate coriaceous.
Leaves mealy or silvery-lepidote.
Fruit a utricle.
36. CHENOPODIACEAE (p. 164).

Fruit drupelike.
88. ELAEAGNACEAE (p. 369).

Leaves not mealy or lepidote.
Flowers partly (staminate) in aments. Fruit an acorn_____**28. FAGACEAE** (p. 138).

Flowers not in aments.
Flowers monoecious or dioecious. Fruit a red pubescent drupe.
74. ANACARDIACEAE (p. 346).

Flowers perfect.
Stamens numerous. Fruit a drupe.
60. AMYGDALACEAE (p. 284).

Stamens 10 or fewer.
Base of petiole conspicuously swollen.
100. OLEACEAE (p. 412).

Base of petiole scarcely swollen.
Stamens opposite the petals; leaves often 3-ribbed (in *Ceanothus*).
77. RHAMNACEAE (p. 349).

Stamens alternate with the corolla lobes; leaves mostly pinnativeined.
Ovary superior.
96. ERICACEAE (p. 406).

Ovary inferior.
97. VACCINIACEAE (p. 408).

C. Aquatic plants, wholly or partly immersed (see also next section).

Leaves 10 cm. long or more, cordate-ovate or peltate, floating. Flowers large, yellow_____**43. NYMPHAEACEAE** (p. 200).

Leaves small, entire or dissected.
Leaves dissected, bladder-bearing. Flowers bilabiate, yellow; ovary superior_____**118. PINGUICULACEAE** (p. 510).

Leaves not bladder-bearing.
Leaves dichotomously forked, the divisions spinulose.
44. CERATOPHYLLACEAE (p. 201).

Leaves entire or dissected, not spinulose.
Leaves simple to 3-foliolate, basal, long-petioled.
Leaves peltate-orbicular or reniform, crenate____Hydrocotyle (p. 391).
Leaves simple to 3-foliolate, the margin entire.
103. MENYANTHACEAE (p. 418).
Leaves dissected or linear.
Flowers white, on peduncles opposite the leaves__Batrachium (p. 213).
Flowers inconspicuous.
Submerged leaves linear, entire_72. CALLITRICHACEAE (p. 346).
Submerged leaves dissected____91. HALORAGIDACEAE (p. 387).

D. Plants twining or climbing on other plants.

Leaves palmately 3 to 7-lobed, opposite, simple.
30. CANNABINACEAE (p. 140).
Leaves not palmately lobed.
Stipules sheathing_____Bilderdykia (p. 164).
Stipules, if present, not sheathing.
Leaves opposite, 1 to 3-ternately compound, the upper often simple.
Clematis (p. 209).
Leaves simple or pinnate, alternate or opposite.
Corolla irregular, of distinct petals. Fruit a pod.
64. FABACEAE (p. 288).
Corolla gamopetalous.
Ovary inferior_____121. CAPRIFOLIACEAE (p. 513).
Ovary superior.
Flowers umbellate; ovary of 2 distinct carpels.
105. ASCLEPIADACEAE (p. 420).
Flowers axillary, solitary or cymose; ovary commonly 2-celled.
107. CONVOLVULACEAE (p. 424).

E. Plants not twining or climbing, often prostrate and rooting at the nodes.

Leaves conspicuously punctate and opposite.
Stems terete; petals distinct. Punctation mostly marginal.
80. HYPERICACEAE (p. 357).
Stems 4-sided; petals united_____113. MENTHACEAE (p. 475).
Leaves commonly not punctate or, if punctate, alternate.
Leaves compound. (For plants with simple leaves see p. 39.)
Corolla gamopetalous.
Leaves 3-foliolate and long-petioled, basal.
103. MENYANTHACEAE (p. 418).
Leaves not 3-foliolate and long-petioled.
Ovary inferior.
Leaves pinnate_____123. VALERIANACEAE (p. 517).
Leaves ternately compound_____122. ADOXACEAE (p. 516).
Ovary superior.
Stamens 4, didymous; fruit separating into 2 to 4 nutlets.
111. VERBENACEAE (p. 468).
Stamens 5, equal; fruit a capsule.
Inflorescence more or less scorpioid; stigmas 2.
109. HYDROPHYLLACEAE (p. 440).
Inflorescence not scorpioid; stigmas 3.
108. POLEMONIACEAE (p. 425).

Corolla of distinct petals (united below in Fumariaceae, p.).
Corolla papilionaceous. Stamens monadelphous or diadelphous.
64. FABACEAE (p. 288).

Corolla not papilionaceous.
Corolla irregular.
Flowers with upper sepal spurred or hoodlike.
45. RANUNCULACEAE (p. 201).
Flowers with petals united into a spur.
48. FUMARIACEAE (p. 217).

Corolla regular.
Flowers in simple or compound umbels, these often reduced to a head. Stamens 5; styles 2——**92. APIACEAE** (p. 387).
Flowers commonly not in umbels.
Stamens tetradynamous. Style 1—**49. BRASSICACEAE** (p. 218).
Stamens not tetradynamous.
Stamens perigynous (inserted on the calyx).
Stamens numerous——**58. ROSACEAE** (p. 263).
Stamens not more than twice as many as the petals.
Flowers racemose, cymose, or paniculate.
54. SAXIFRAGACEAE (p. 252).
Flowers solitary on axillary peduncles.
73. LIMNANTHACEAE (p. 346).

Stamens hypogynous.
Calyx deciduous. Leaves dissected——**Eschscholtzia** (p. 216).
Calyx persistent.
Petals 4. Stamens 6 or more, nearly equal; ovary stipitate, 1-celled——**50. CAPPARIDACEAE** (p. 248).
Petals or petaloid sepals 5 or more.
Ovaries 2 or more, distinct, with an equal number of styles——**45. RANUNCULACEAE** (p. 201).
Ovary simple or compound.
Ovary 1-celled. Leaves once or twice pinnate.
62. CAESALPINIACEAE (p. 287).
Ovary compound.
Leaves palmately lobed or dissected.
65. GERANIACEAE (p. 336).
Leaves abruptly pinnate.
67. ZYGOPHYLLACEAE (p. 339).

Leaves simple.
Corolla gamopetalous (wanting in *Glaux*, p. 411), regular or 2-labiate.
(For plants with distinct petals see p. 41.)
Corolla scarious. Flowers spicate, mostly 4-merous; plants scapose; leaves entire, ribbed——**119. PLANTAGINACEAE** (p. 510).
Corolla not scarious.
Stipules present, often reduced to a line connecting the bases of the petioles. Leaves opposite or verticillate.
Corolla gamopetalous; ovary inferior—**120. RUBIACEAE** (p. 511).
Corolla of free petals; ovary superior.
Ovary 1-celled; sepals persistent, united into a tube.
82. FRANKENIACEAE (p. 358).
Ovary 2 to 5-celled; sepals free——**81. ELATINACEAE** (p. 357).

Stipules none.
Ovary inferior.
Corolla bilabiate, the lip commonly cleft.
127. LOBELIACEAE (p. 520).
Corolla regular.
Leaves opposite ---------- **123. VALERIANACEAE** (p. 517).
Leaves alternate ---------- **126. CAMPANULACEAE** (p. 519).
Ovary superior.
Corolla 2-labiate.
Leaves palmately 5 to 7-ribbed, suborbicular or round-ovate, 5 to 30 cm. broad ---------- **116. MARTYNIACEAE** (p. 508).
Leaves prevailing pinnate-veined.
Fruit 2 to 4-celled, separating into as many nutlets.
111. VERBENACEAE (p. 468).
Fruit a 2-celled capsule.
114. SCROPHULARIACEAE (p. 482).
Corolla regular.
Stamens 2 ---------- Veronica (p. 500).
Stamens 4 or more.
Plant a tall scapose perennial. Leaves long-petioled, oblanceolate; inflorescence paniculate --- Limonium (p. 412).
Plants, if scapose, not over 30 cm. high.
Stamens inserted on the corolla tube opposite the lobes.
Ovary 1-celled, the placenta central. Corolla inconspicuous in *Androsace* and *Samolus*.
98. PRIMULACEAE (p. 409).
Stamens alternate with the lobes of the corolla.
Ovaries 2, separate. Styles simple or none; fruit a pair of follicles.
Filaments distinct ---- **104. APOCYNACEAE** (p. 418).
Filaments monadelphous.
105. ASCLEPIADACEAE (p. 420).
Ovary 1, 1 to many-celled.
Ovary 1-celled; style simple; leaves prevailingly opposite ---------- **102. GENTIANACEAE** (p. 414).
Ovary with 2 or more cells; styles united or distinct; leaves various.
Styles 2. Ovary and capsule pubescent; leaves silvery canescent ---------- Cressa (p. 424).
Style 1, simple or cleft.
Style 3-cleft ---- **108. POLEMONIACEAE** (p. 425).
Style simple or 2-cleft.
Ovary deeply 4-lobed, developing into 2 to 4 nutlets. Inflorescence usually scorpioid; plants mostly rough-hairy.
110. BORAGINACEAE (p. 450).
Ovary not lobed.
Style 2-cleft (occasionally cleft to base); flowers on scapes or in scorpioid racemes or cymes.
109. HYDROPHYLLACEAE (p. 440).
Style simple; flowers solitary or cymose.
112. SOLANACEAE (p. 470).

Corolla of distinct or nearly distinct petals, or wanting.
Flowers irregular, papilionaceous or spurred.
Flowers papilionaceous. Fruit a 1 or 2-celled pod.
64. FABACEAE (p. 288).
Flowers spurred.
Ovaries 1 to 3, developing into follicles; plants 20 cm. high or more.
Delphinium (p. 205).
Ovary 1-celled, developing into a 3-valved capsule; plants low.
85. VIOLACEAE (p. 358).
Flowers regular, the corolla often wanting.
Stamens tetradynamous. Sepals and petals 4.
49. BRASSICACEAE (p. 218).
Stamens not tetradynamous.
Corolla wanting, the calyx often petaloid.
Flowers subtended by a calyx-like involucre of distinct or united bracts.
Flowers monoecious or dioecious. Ovary superior, 3-celled.
71. EUPHORBIACEAE (p. 341).
Flowers perfect. Calyx petaloid.
Calyx 5 to 8-toothed; stamens 9_____**Eriogonum** (p. 146).
Calyx 3 or 5-lobed; stamens 1 to many.
38. NYCTAGINACEAE (p. 180).
Flowers not subtended by a calyx-like involucre.
Stems swollen at the nodes, the leaves opposite.
42. SILENACEAE (p. 190).
Stems not swollen at the nodes.
Stamens numerous.
Stamens hypogynous ____**45. RANUNCULACEAE** (p. 201).
Stamens perigynous_____**58. ROSACEAE** (p. 263).
Stamens 10 or fewer.
Ovary partly or wholly inferior.
Plants root parasites with entire olive-green leaves.
Comandra (p. 143).
Plant a stoloniferous perennial; leaves reniform, broad-toothed_____**Chrysosplenium** (p. 258).
Ovary superior.
Leaves palmately 3 to 7-ribbed.
Leaves opposite or alternate. Flowers in axillary cymes, mostly 4-merous.
32. URTICACEAE (p. 141).
Leaves basal, reniform_____**Oxyria** (p. 160).
Leaves pinnately veined.
Plants prostrate. Leaves opposite or verticillate; flowers axillary or terminal, mostly 5-merous.
39. AIZOACEAE (p. 184).
Plants erect, or, if prostrate, with sheathing stipules.
Stipules persistent.
Stipules sheathing_**35. POLYGONACEAE** (p. 143).
Stipules not sheathing, scarious.
41. CORRIGIOLACEAE (p. 189).
Stipules none.
Fruit a many-seeded capsule. Leaf blades oblong or ovate_____**Synthyris** (p. 501).

Fruit an achene or utricle.
Floral bracts scarious.
37. AMARANTHACEAE (p. 178).
Floral bracts not scarious, or flowers subtended by a gamophyllous involucre.
Flowers subtended by an involucre, if bracted the plants prostrate.
35. POLYGONACEAE (p. 143).
Flowers subtended by bracts; plants erect.
36. CHENOPODIACEAE (p. 164).

Corolla present.
Ovary wholly or partly inferior.
Flowers in simple or compound umbels, these often reduced to heads. Stamens 5, styles 2_____**92. APIACEAE** (p. 387).
Flowers not umbellate.
Stamens as many or twice as many as the calyx lobes.
90. ONAGRACEAE (p. 371).
Stamens very numerous.
Calyx lobes 2. Ovary half inferior_____**Portulaca** (p. 189).
Calyx lobes 5.
Ovary 1-celled, oblong or elongate; petals 5 or 10.
Scabrous herbs_____**86. LOASACEAE** (p. 361).
Ovary 2 to 5-celled; petals usually 5.
58. ROSACEAE (p. 263).

Ovary superior.
Petals laciniate, hypogynous. Small herb with alternate or fascicled leaves and flowers in terminal spikes.
51. RESEDACEAE (p. 251).
Petals not laciniate, often cleft or fringed below.
Calyx lobes or sepals 2 (6 or 8 in *Lewisia*). Stamens as many as the petals; styles or style branches 2 to 5; ovary 1-celled_____**40. PORTULACACEAE** (p. 185).
Calyx lobes or sepals 3 or more.
Stamens very numerous.
Stamens monadelphous_____**79. MALVACEAE** (p. 352).
Stamens free.
Leaves alternate or basal.
45. RANUNCULACEAE (p. 201).
Leaves opposite, pinnate_____**Tribulus** (p. 339).
Stamens not more than twice as many as the sepals or calyx lobes.
Sepals caducous. Ovary 1 to many-celled; fruit a capsule_____**47. PAPAVERACEAE** (p. 215).
Sepals persistent.
Style 1, or styles several and united to the top or nearly so.
Leaves entire, coriaceous and evergreen. Anthers opening by pores or slits.
94. PYROLACEAE (p. 404).
Leaves neither coriaceous nor evergreen.
Leaves entire, opposite.
89. LYTHRACEAE (p. 370).
Leaves palmately lobed.
65. GERANIACEAE (p. 336).

Styles or sessile stigmas 2 to 5.
Nodes swollen. Leaves opposite.
42. SILENACEAE (p. 190).
Nodes not swollen.
Leaves long-petioled, beset with purplish glandular hairs.
52. DROSERACEAE (p. 251).
Leaves not purplish-glandular.
Staminodia present. Leaves mostly basal; stems usually with 1 leaf.
55. PARNASSIACEAE (p. 258).
Staminodia none.
Plants succulent. Carpels as many as the sepals.
53. CRASSULACEAE (p. 258).
Plants not succulent.
Carpels mostly 2, distinct or nearly so; styles 2 or 3.
54. SAXIFRAGACEAE (p. 252).
Carpels united into a 5-celled ovary; styles 5___**66. LINACEAE** (p. 338).

ANNOTATED CATALOGUE

PTERIDOPHYTA. Ferns and fern allies

(Contributed by William R. Maxon)

Plants without true flowers, reproducing by spores (no embryo being formed); fernlike, mosslike, or rushlike plants.

KEY TO THE FAMILIES

Plants mosslike, depressed or short-creeping; leaves very numerous, minute, acicular or bractlike, 4 to many-ranked, sessile, never united. Plants heterosporous, producing megaspores and microspores
6. SELAGINELLACEAE (p. 51).
Plants not mosslike, mostly erect, climbing, or wide-creeping; leaves relatively few, large, or, if small, united into short sheaths upon the stem or its branches. Plants either homosporous or heterosporous.
Stems jointed, fluted and mostly hollow, either simple and rushlike or with numerous whorled branches; leaves minute, united into toothed sheaths at the nodes; sporophylls small, borne in terminal cones.
5. EQUISETACEAE (p. 50).
Stems not jointed or fluted, solid, without whorled branches; leaves mostly large, simple to compound; sporophylls never in cones.
Plants aquatic; leaves grasslike, tufted upon a very short trunk, the sporangia borne within their hollow bases_**4. ISOETACEAE** (p. 50).
Plants mostly terrestrial; leaves not grasslike; sporangia not borne within hollow leaf bases.
Spores of two kinds, megaspores and microspores; sporangia borne within large pedunculate conceptacles (sporocarps) near the base of the leaves; leaf blades 4-foliolate.
3. MARSILEACEAE (p. 50).

Spores uniform; sporangia borne in special spikes or panicles, or upon the under side of ordinary foliage leaves.
Sporangia minute, stalked, borne in clusters (sori) on the back of ordinary leaves or modified parts of these.
2. POLYPODIACEAE (p. 44).
Sporangia very large, sessile, united in a simple fleshy spike or borne in a loose panicle, the sterile blade (simple to compound) appearing lateral---**1. OPHIOGLOSSACEAE** (p. 44).

1. OPHIOGLOSSACEAE. Adderstongue Family

Sporophytes herbaceous; rhizome short, fleshy, with numerous fibrous, often fleshy roots; leaves 1 or several, consisting of a simple to compound, sessile or stalked sterile blade and (in fertile leaves) a stalked sporebearing spike or panicle, these borne on an erect common stalk. Sporangia large, naked, opening by a transverse slit. Gametophytes (prothallia) hypogean.

1. BOTRYCHIUM Swartz. GRAPEFERN

Common stalk about one-half to wholly hypogean; sterile blade distinctly stalked ---------- **1. B. simplex.**
Common stalk almost wholly epigean; sterile blade sessile or nearly so. **2. B. lunaria.**

1. Botrychium simplex E. Hitchc. Amer. Journ. Sci. **6**: 103, *pl. 8*. 1823.

Grassy meadows and open slopes, chiefly in the yellow pine belt. Quebec and New England to British Columbia, southward to southern California and Nevada and in the Rocky Mountains to Colorado; also in Europe.

2. Botrychium lunaria (L.) Swartz, Journ. Bot. Schrad. **1800**[2]: 110. 1801.

Osmunda lunaria L. Sp. Pl. 1064. 1753.

Moist meadows and open fields of the spruce belt. Newfoundland and Labrador to Alaska, south to Vermont, Michigan, Minnesota, and in the mountains to Colorado. Ascribed to the vicinity of Fish Lake, Utah.

2. POLYPODIACEAE. Fern Family

Leafy plants of various habit, the rhizomes slender and creeping to stoutish and erect; fronds pendent to erect, coiled in vernation; blades simple to several times pinnatifid or pinnate. Sporangia small, stalked, borne on the under side of ordinary blades, usually in clusters (sori) with or without an indusium, or on contracted modified pinnae or wholly fertile blades. Gametophytes (prothallia) green, epigean.

Sori dorsal upon the veins, separate, not marginal.
Indusium wholly or partially inferior.
Indusium wholly inferior, the divisions stellate or spreading. **1. WOODSIA.**
Indusium attached by its base at one side, hood-shaped, thrust back at maturity ---------- **2. FILIX.**
Indusium, if present, superior.
Sori round to oval.
Stipes jointed to the rhizome: blades pinnatifid or pinnatisect; indusia wanting ---------- **3. POLYPODIUM.**
Stipes continuous with the rhizome; blades 1 to 3-pinnate; indusia present in most species.
Indusium orbicular, centrally peltate---------- **4. POLYSTICHUM.**
Indusium (if present) roundish-reniform, attached at its sinus. **5. DRYOPTERIS.**

Sori oblong or linear to lunate or hippocrepiform (roundish in *Athyrium americanum*).
Venation partially areolate, the large tumid sori borne in a chainlike row close to the midribs_____6. **WOODWARDIA.**
Venation wholly free; sori small, oblique.
Blades small, evergreen; rhizome scales with dark-walled cells; sori oblong to linear, straight or nearly so_____7. **ASPLENIUM.**
Blades large. delicate; rhizome scaels with thin-walled cells; sori mostly lunate to hippocrepiform or roundish__8. **ATHYRIUM.**
Sori marginal or submarginal (borne at or near the apex of the veins) or in a few cases the sporangia decurrent on the veins or completely covering them.
Sporangia following the veins throughout_____9. **PITYROGRAMMA.**
Sporangia borne at or near the apex of the veins.
Fronds strongly dimorphous, the fertile blades with contracted linear segments _____10. **CRYPTOGRAMMA.**
Fronds (fertile and sterile) alike or nearly so.
Plants large, coarse; sporangia borne on a veinlike receptacle connecting the ends of the veins; indusium double, the inner one minute, concealed_____11. **PTERIDIUM.**
Plants mainly small; sporangia not borne on a special receptacle; indusia (if any) single.
Sporangia borne on the under side of sharply reflexed membranous lobes_____12. **ADIANTUM.**
Sporangia not borne on the back of reflexed lobes.
Vein ends distinctly thickened; proper indusium often present. **13. CHEILANTHES.**
Vein ends scarcely or not at all enlarged; proper indusium invariably wanting.
Margin of segments widely reflexed or revolute, usually modified; blades glabrous or nearly so_____14. **PELLAEA.**
Margin of segments narrowly or not at all revolute; blades variously hairy, scaly, or ceraceous beneath. **15. NOTHOLAENA.**

1. WOODSIA R. Br. Woodsia

Blades glandular-puberulent and bearing flattish, septate, whitish hairs. **1. W. scopulina.**
Blades glabrous_____**2. W. oregana.**

1. Woodsia scopulina D. C. Eaton, Canad. Nat. II. **2**: 91. 1865.

Crevices and talus of cliffs; chiefly in the yellow pine belt. Alaska to Quebec, Ontario, South Dakota, and Utah (here ascending to 3,300 meters), and in the Sierra Nevada to Tulare County, California; also in West Virginia and North Carolina.

2. Woodsia oregana D. C. Eaton, Canad. Nat. II. **2**: 90. 1865.

Crevices of dryish cliffs and rock slopes; chiefly in the yellow pine belt. British Columbia to South Dakota, Nebraska, New Mexico, and Arizona, and in the Sierra Nevada to southern California.

2. FILIX Adans. Bladderfern

Blades narrowly triangular-lanceolate, the apex long-tapering to a slender tip, usually bearing fleshy bulblets beneath_____**1. F. bulbifera.**
Blades broadly lanceolate, the apex short-pointed; bulblets wanting. **2. F. fragilis.**

1. Filix bulbifera (L.) Underw. Native Ferns, ed. 6. 119. 1900.
Polypodium bulbiferum L. Sp. Pl. 1091. 1753.
Cystopteris bulbifera Bernh. Neu. Journ. Bot. Schrad. 1²: 26. 1806.

Moist shaded slopes and rocky ravines, mainly in the yellow pine belt. Newfoundland to Manitoba, south to Georgia and Arkansas, and in the Rocky Mountains to Utah (Elk Mountains) and Arizona.

2. Filix fragilis (L.) Gilib. Exerc. Phyt. 558. 1792.
Polypodium fragile L. Sp. Pl. 1091. 1753.
Cystopteris fragilis Bernh. Neu. Journ. Bot. Schrad. 1²: 27. 1806.

Rocky woods and moist situations of the aspen, spruce, and alpine belts. Alaska to Labrador and Newfoundland, southward nearly throughout the United States; also in Eurasia and tropical America.

3. POLYPODIUM L. Polypody

1. Polypodium hesperium Maxon, Proc. Biol. Soc. Washington **13**: 200. 1900.

Cliffs and rock slopes; chiefly in the aspen and spruce belts. Yukon to South Dakota, New Mexico, Arizona, and southern California.

4. POLYSTICHUM Roth. Hollyfern

Pinnae simple, serrate-dentate, with long, spreading, spinulose teeth.
1. P. lonchitis.
Pinnae pinnately lobed or divided at the base, the lobes and teeth oblique, merely pungent **2. P. scopulinum.**

1. Polystichum lonchitis (L.) Roth, Archiv Bot. Roemer 2¹: 106. 1799.
Mountain hollyfern.
Polypodium lonchitis L. Sp. Pl. 1088. 1753.

Rocky shaded slopes in the alpine belts. Alaska to Nova Scotia, southern Ontario, Michigan, and Montana, and in the mountains to Colorado, Utah, and northern California; also in Greenland and Europe.

2. Polystichum scopulinum (D. C. Eaton) Maxon, Fern Bull. **8**: 29. 1900.
Aspidium aculeatum scopulinum D. C. Eaton, Ferns N. Amer. **2**: 125. *pl. 62, f. 8.* 1880.

Dry cliffs and rock crevices of the spruce and subalpine belts. Central Washington to eastern Idaho, south to Utah and southern California, ascending to 2,900 meters; also in Gaspé County, Quebec.

5. DRYOPTERIS Adans. Woodfern

Blades deltoid, nearly equilateral, 8 to 25 cm. long; indusia wanting.
1. D. linnaeana.
Blades oblong-lanceolate, 25 to 100 cm. long; indusia present **2. D. filix-mas**

1. Dryopteris linnaeana C. Chr. Ind. Fil. 275. 1905.
Polypodium dryopteris L. Sp. Pl. 1093. 1753.
Phegopteris dryopteris Fée, Gen. Fil. 243. 1852.
Dryopteris dryopteris Christ, Bull. Acad. Internat. Geogr. Bot. 20¹: 151. 1909.

Moist woods, thickets, and swamps of the yellow pine, aspen, and spruce belts. Alaska to Newfoundland, south to Oregon, Arizona, New Mexico, Kansas, Wisconsin, and the mountains of Virginia; also in Greenland and Eurasia.

2. Dryopteris filix-mas (L.) Schott, Gen. Fil. 1834.
Polypodium filix-mas L. Sp. Pl. 1090. 1753.

Rocky woods of the spruce and subalpine belts. Newfoundland to British Columbia, south to Vermont, South Dakota, western Oklahoma, New Mexico, Arizona, Nevada, and southern California; Eurasia.

6. WOODWARDIA J. E. Smith. CHAINFERN

1. Woodwardia chamissoi Brack. in Wilkes, U. S. Expl. Exped. **16**: 138. 1854.
Woodwardia radicans americana Hook. Sp. Fil. **3**: 67, in part. 1860.

Moist shady banks, ascending to 1,500 meters, in the artemisia, pinyon, and yellow pine belts. Western British Columbia to southern California and Arizona; also in northeastern Nevada.

7. ASPLENIUM L. SPLEENWORT

Plants grasslike, densely tufted; stipes greenish from a brown base; blades short, alternately divided into a few narrowly cuneate segments. **1. A. septentrionale.**

Plants not grasslike; stipes and rachis purplish brown, lustrous; blades narrowly linear, once pinnate, the pinnae numerous, mostly oval or oblong. **2. A. trichomanes.**

1. Asplenium septentrionale (L.) Hoffm. Deutschl. Fl. **2**: 12. 1795.
Acrostichum septentrionale L. Sp. Pl. 1068. 1753.

Dryish rock crevices of the yellow pine, aspen, and spruce belts. Wyoming to New Mexico and Arizona; Black Hills of South Dakota; Lower California; Eurasia. Apparently nowhere abundant in its American range, but doubtless occurring in Utah.

2. Asplenium trichomanes L. Sp. Pl. 1080. 1753.

Crevices of moist cliffs, usually limestone, chiefly in the yellow pine, aspen, and spruce belts. Alaska to Nova Scotia, south in the mountains to Oregon, Arizona, New Mexico, Alabama, and Georgia; Eurasia.

8. ATHYRIUM Roth

Blades ample, foliose, the segments mostly close; indusia oblong to lunate or hippocrepiform, fringed with septate cilia ---------- **1. A. filix-femina.**

Blades skeleton-like, the segments narrow, oblique, distant; indusia wanting, the sori roundish ---------- **2. A. americanum.**

1. Athyrium filix-femina (L.) Roth, Archiv Bot. Roemer **2**[1]: 106. 1799. LADY FERN.

Polypodium filix-femina L. Sp. Pl. 1090. 1753.
Athyrium cyclosorum of American authors.

Forests, moist thickets, and brushy slopes of the yellow pine, aspen, and spruce belts. Alaska to southern California and in the Rocky Mountains to Nevada and New Mexico; Eurasia.

2. Athyrium americanum (Butters) Maxon, Amer. Fern Journ. **8**: 120. 1918.
Athyrium alpestre americanum Butters, Rhodora **19**: 204. 1917.

Moist rocky ravines, meadows, and alluvial thickets of the alpine belts. Alaska to Colorado, Nevada (Elko County), and California; also in Gaspé County, Quebec.

9. PITYROGRAMMA Link. GOLDFERN

1. Pityrogramma triangularis (Kaulf.) Maxon, Contr. U. S. Nat. Herb. **17**: 173. 1913.
Gymnogramma triangulare Kaulf. Enum. Fil. 73. 1824.
Ceropteris triangularis Underw. Bull. Torrey Club **29**: 630. 1902.

Rocky shaded slopes. British Columbia (Vancouver Island) to Nevada (Clark County) and southern California, mainly at low elevations; also in northern Lower California.

10. CRYPTOGRAMMA R. Br. Rockbrake

1. Cryptogramma acrostichoides R. Br. in Richards. Bot. App. Frankl. Journ. 767. 1823.

Cliffs and rock slopes, in open situations, of the spruce and subalpine belts. Alaska to Labrador, southward in the high mountains to southern California, Nevada, Utah, northern New Mexico, and the northern shores of Lake Huron.

11. PTERIDIUM Scop. Bracken

1. Pteridium aquilinum pubescens Underw. Native Ferns ed. 6. 91. 1900.

Open slopes, thickets, and moist woods. Alaska to Montana, southward to the Mexican Border region.

12. ADIANTUM L. Maidenhair

Blades reniform-orbicular, the two equal divisions spreading, with linear pinnate branches at the outer side.----------1. **A. pedatum aleuticum.**
Blades elongate, with a continuous main rachis, the pinnae alternate.
  Rachis distinctly flexuose throughout; pinnules of firm texture; indusia nearly 2 mm. broad----------2. **A. rimicola.**
  Rachis nearly straight; pinnules membranous; indusia mostly about 1 mm. broad----------3. **A. capillus-veneris.**

1. Adiantum pedatum aleuticum Rupr. Beitr. Pflanzenk. Russ. Reich. **3:** 49. 1845.

Cliffs and rich rocky or swampy woods of the aspen and spruce belts. Alaska to the mountains of southern Callfornia and along the Rocky Mountains to Utah; also Quebec and Northern Vermont.

2. Adiantum rimicola Slosson, Bull. Torrey Club **41:** 308. *pl. 7, f. 1.* 1914.

Partially shaded crevices of sandstone rocks. Known only from Armstrong Canyon, southeastern Utah, altitude 1,600 to 1,800 meters.

3. Adiantum capillus-veneris L. Sp. Pl. 1096. 1753.

Adiantum modestum Underw. Bull. Torrey Club **28:** 46. 1901.

Shaded banks and rocky ravines of the Covillea and artemisia belts. Virginia to Florida, west to Missouri, Utah, southern California, and the Mexican Border region; warm-temperate regions of both hemispheres.

13. CHEILANTHES Swartz. Lipfern

Fronds glabrous and naked; sori with a thin proper indusium.
  ----------1. **C. siliquosa.**
Fronds variously scaly, tomentose, or hairy; sori protected by the deeply recurved, scarcely modified margin, a proper indusium wanting.
  Blades wholly devoid of scales----------2. **C. feei.**
  Blades (at least the rachises) scaly beneath.
    Segments mostly oblong, densely rusty-tomentose beneath, only the rachises scaly----------3. **C. gracillima.**
    Segments roundish or oval, concealed by large imbricate scales beneath.
    ----------4. **C. covillei.**

1. Cheilanthes siliquosa Maxon, Amer. Fern Journ. **8:** 116. 1918.

Onychium densum Brack. in Wilkes, U. S. Expl. Exped. **16:** 120. *pl. 13, f. 2.* 1854. Not *Cheilanthes densa* Fée, 1852.

Pellaea densa Hook. Sp. Fil. **2:** 150. *pl. 125, B.* 1858.

Crevices of cliffs and rock outcrops of the yellow pine, aspen, and spruce belts. Vancouver Island to northern Montana, south to Utah and California; also in Gaspé County, Quebec, and Grey County, Ontario.

2. Cheilanthes feei Moore, Ind. Fil. xxxviii. 1857.

Myriopteris gracilis Fée, Gen. Fil. 150. *pl. 29, f. 6.* 1852.

Cheilanthes gracilis Riehl; Mett. Abh. Senckenb. Ges. Frankfurt **3**: 80. 1859. Not *C. gracilis* Kaulf. 1824.

Ledges and rock crevices. Illinois and southern Minnesota to British Columbia, Washington, southern California (Providence Mountains), and the Mexican Border region from central Texas westward.

3. Cheilanthes gracillima D. C. Eaton in Torr. U. S. & Mex. Bound. Bot. **2**[1]: 234. 1859.

Ledges and rock crevices of the yellow pine, aspen, and spruce belts. Vancouver Island to western Montana, south in the mountains to Nevada (Lincoln County) and California.

4. Cheilanthes covillei Maxon, Proc. Biol. Soc. Washington **31**: 147. 1918.

Rock crevices and rocky slopes, chiefly in the artemisia, pinyon, and yellow pine belts. Southern California and adjacent parts of Nevada and Arizona.

14. PELLAEA Link. CLIFFBRAKE

Blades once pinnate, or the lower pinnae ternately divided.

Pinnae mostly 2-parted, "mitten-shaped," membranous, the veins evident; stipes corrugate, easily breaking ..... 1. P. breweri.

Pinnae simple or the lower ones sometimes 3-cleft or 3-divided; stipes not wrinkled ..... 2. P. suksdorfiana.

Blades fully bipinnate ..... 3. P. longimucronata.

1. Pellaea breweri D. C. Eaton, Proc. Amer. Acad. **6**: 555. 1865.

Exposed rocky slopes and clefts of rocks, usually granite, of the yellow pine, aspen, and spruce belts. Sierra Nevada, California, to southern Washington, eastward to Utah, western Wyoming, and Idaho.

2. Pellaea suksdorfiana Butters, Amer. Fern Journ. **11**: 40. 1921.

Pellaea glabella simplex Butters, Amer. Fern Journ. **7**: 84. 1917.

Clefts of dry limestone cliffs. British Columbia and Washington, south in the Rocky Mountains to New Mexico and Arizona.

3. Pellaea longimucronata Hook. Sp. Fil. **2**: 143. *pl. 115, A.* 1858.

Pellaea truncata Goodding, Muhlenbergia **8**: 94. 1912.

Cliffs and dry rocky slopes. Southwestern New Mexico to southern Utah, southern Nevada (Bunkerville, *Goodding* 737; Mica Spring, *Jones* 5055), and western Arizona; also in south-central Colorado.

15. NOTHOLAENA R. Br. CLOAKFERN

Blades densely tomentose beneath, coarsely hirsute-tomentose above. 1. N. parryi.

Blades wholly glabrous, or ceraceous beneath.

Segments few, relatively large, glabrous, not at all pulverulent beneath. 2. N. jonesii.

Segments numerous, small, copiously whitish-ceraceous beneath.

Rachises sharply flexuose ..... 3. N. fendleri.

Rachises nearly straight ..... 4. N. limitanea.

1. Notholaena parryi D. C. Eaton, Amer. Nat. **9**: 351. 1875.

Crevices of rocks. Desert region of southern California to south-central Arizona and southwestern Utah.

2. Notholaena jonesii Maxon, Amer. Fern Journ. **7**: 108. 1917.

Notholaena tenera D. C. Eaton, Ferns N. Amer. **1**: 335–338. *pl. 43, f. 9–13.* 1879. Not *N. tenera* Gill. 1831.

Rocky desert slopes of the artemisia belt. Southwestern Utah and the desert regions of southern California.

3. Notholaena fendleri Kunze, Farrnkr. **2**: 87. *pl. 136.* 1851.

Clefts of exposed rocks. Colorado, Arizona, and New Mexico; probably occurring in Utah.

4. Notholaena limitanea Maxon, Amer. Fern Journ. **9**: 70. 1919.

Notholaena nivea and *N. nivea dealbata* in part of American authors. Not *N. nivea* Desv. 1813, nor *N. dealbata* (Pursh) Kunze, 1848.

Clefts of dry limestone rocks of the artemisia belt. New Mexico, Arizona, and Utah (mesa between Bears Ears and Natural Bridges of White Canyon).

3. MARSILEACEAE. Pepperwort Family

Perennial herbaceous plants of moist situations; rhizomes slender, creeping, rooting in mud; leaf blades 4-foliolate (in our representatives), long-petioled. Sporocarps (in our species) borne on peduncles arising from the basal region of the petiole or from an adjacent part of the rhizome, large, bony, ovoid, 2-celled vertically, with transverse compartments containing both megaspores and microspores.

1. MARSILEA L. Pepperwort

1. Marsilea vestita Hook. & Grev. Icon. Fil. **2**: *pl. 159.* 1831.

Muddy depressions and banks of ponds and watercourses. British Columbia to Montana and South Dakota, south to southern California, Nevada, Colorado, Texas, Oklahoma, and Arkansas.

4. ISOETACEAE. Quillwort Family

Small, submersed or partly emersed plants of ponds and streams; stem short, cormlike, crowned by numerous crowded subulate leaves. Sporangia axillary, borne within the enlarged hollow leaf bases, producing large spherical megaspores and very numerous minute angled microspores in separate sporangia.

1. ISOETES L. Quillwort

Leaves 4 to 10 cm. long; megaspores low-tuberculate_____1. **I. bolanderi.**
Leaves 8 to 20 cm. long; megaspores spinulose_____2. **I. braunii.**

1. Isoetes bolanderi Engelm. in Parry, Amer. Nat. **8**: 214. 1874.

In water. Montana to Washington, south to western Colorado, Utah, and California.

2. Isoetes braunii Durieu, Bull. Soc. Bot. France **11**: 101. 1864.

Isoetes echinospora braunii Engelm. in A. Gray, Man. ed. 5. 676. 1867.

In water. Labrador to Alaska, south to New Jersey, Michigan, Utah, and Washington.

5. EQUISETACEAE. Horsetail Family

Rushlike plants, mainly of low situations; rhizomes perennial, blackish, wide-creeping; stems usually erect, cylindric, fluted, siliceous, simple or with whorled branches at the solid sheathed nodes, the internodes usually hollow; leaves minute, united lengthwise to form cylindric sheaths, the tips connivent

or free, persistent or deciduous. Fruit a terminal cone formed of stalked peltate bracts, these bearing a few sporangia beneath; spores uniform, provided with 4 hygroscopic bands. Gametophytes minute, dioecious, green.

1. EQUISETUM L. Horsetail. Scouring-rush

Aerial stems dimorphous, the fertile ones flesh-colored or brownish, nearly devoid of chlorophyll, succulent, soon withering, the sterile ones green, much branched ..... 1. E. arvense.

Aerial stems uniform; branches few if any, basal or in irregular whorls.

Spikes blunt or barely acute; aerial stems annual, not surviving the winter. 2. E. kansanum.

Spikes rigidly apiculate; aerial stems evergreen, persisting two or more seasons.

Sheaths distinctly longer than broad, dilated above, somewhat funnel-shaped, the lower ones with a dark band below. 3. E. laevigatum.

Sheaths nearly or quite as broad as long, nearly cylindric, tight, mostly ashy at maturity, with 2 dark bands.

Ridges of the stem with a row of elevated bands of silica; leaves sharply 3-carinate, the central keel sometimes grooved. 4. E. praealtum.

Ridges of the stem usually with 2 distinct rows of silica tubercles; leaves 4-carinate, the central groove narrow but usually well defined ..... 5. E. hiemale californicum.

1. Equisetum arvense L. Sp. Pl. 1061. 1753.

Thickets, alluvial situations, and open or shaded, sandy banks. Alaska to Labrador and Newfoundland, southward nearly throughout the United States; Greenland; Eurasia.

2. Equisetum kansanum Schaffn. Ohio Nat. 13: 21. 1912.

River banks and moist slopes, commonly in clay. British Columbia to Ontario, south to southern California, Arizona, New Mexico, Missouri, and Ohio.

3. Equisetum laevigatum A. Br. Amer. Journ. Sci. 46: 87. 1844.

Equisetum hiemale intermedium A. A. Eaton, Fern Bull. 10: 120. 1902.
Equisetum intermedium Rydb. Fl. Rocky Mount. 1053. 1917.

Damp alluvial thickets and sandy banks. British Columbia to southern California, east to New York, Illinois, Missouri, and Texas.

4. Equisetum praealtum Raf. Fl. Ludov. 13. 1817.

Equisetum robustum A. Br. Amer. Journ. Sci. 46: 88. 1844.

Moist, usually alluvial situations. British Columbia to Quebec, southward nearly throughout the United States.

5. Equisetum hiemale californicum Milde, Nov. Act. Acad. Caes. Leop. Carol. 32^2: 517. 1867.

Moist alluvial situations, often in shade. Alaska to southern California, Nevada, Arizona, and New Mexico.

6. SELAGINELLACEAE. Selaginella Family

Low, depressed or creeping, branched, leafy, terrestrial plants of mosslike habit; leaves very numerous, in most species difform and borne in 4 dorsal rows, or (in our species) alike, imbricate, and spirally arranged in many ranks. Sporangia in terminal quadrangular sessile spikes of modified leaves (sporophylls), axillary, the larger ones bearing 3 or 4 large megaspores, the smaller ones minute, reddish or orange, powdery microspores.

1. SELAGINELLA Beauv. SELAGINELLA

Stems about 1 mm. thick, wide-creeping, forming an intricate mat; leaves lacking an apical bristle_____1. S. mutica.
Stems 2 to 2.5 mm. thick, short-creeping, the branches mostly erect or assurgent, tufted; leaves with a distinct apical bristle.
Apical bristle stout, short, yellowish green_____2. S. watsoni.
Apical bristle slender, 1 to 1.5 mm. long, white_____3. S. densa.

1. Selaginella mutica D. C. Eaton in Underw. Bull. Torrey Club **25**: 128. 1898.

Shady places about cliffs of the artemisia, pinyon, and yellow pine belts. Western Texas to Colorado, Utah, and Arizona.

2. Selaginella watsoni Underw. Bull. Torrey Club. **25**: 127. 1898.

Sheltered situations about cliffs of the spruce and alpine belts. Colorado to California, ascending to 3,450 meters.

3. Selaginella densa Rydb. Mem. N. Y. Bot. Gard. **1**: 7. 1900.

Dry open slopes, usually among rocks. British Columbia and Washington to Montana, south to Utah and New Mexico.

7. PINACEAE. Pine Family

Mostly evergreen resiniferous trees or shrubs; staminate flowers in short catkins; pistillate flowers in scaly aments.

Leaves awl-shaped or scalelike, opposite or ternate; scales of the pistillate flowers decussate.
Fruit an oblong cone, 10 to 25 mm. long; trees 30 meters high or more. 6. LIBOCEDRUS.
Fruit drupelike; shrubs or small trees_____7. JUNIPERUS.
Leaves needle-like or narrowly linear; scales of pistillate flowers spirally imbricate.
Leaves fascicled (solitary in *Pinus monophylla*); staminate catkins clustered.
Cone scales persistent, more or less thickened at apex_____1. PINUS.
Leaves alternate; staminate catkins solitary, axillary, or terminal.
Branches roughened by the prominent leaf bases. Cone scales persistent.
Leaves sessile, tetragonal_____2. PICEA.
Leaves stalked, flattened_____3. TSUGA.
Branches smooth. Leaves flattened.
Leaves stalked; cones pendent, the scales persistent. 4. PSEUDOTSUGA.
Leaves sessile; cones erect, the scales deciduous from the axis. 5. ABIES.

1. PINUS L. PINE

Leaves solitary, terete, 3 to 5 cm. long. Cones ovoid, 3 to 6 cm. long, the seeds narrowly winged_____1. P. monophylla.
Leaves in fascicles of 2 to 5.
Leaves in 2's or 3's.
Leaves 2 to 6 cm. long.
Trees 12 meters high or less; leaves in 2's or 3's; fibrovascular bundle one; cones 2 to 4 cm. long; seeds narrowly winged____2. P. edulis.
Trees 20 meters high or more; leaves in 2's, twisted; fibrovascular bundles two; cones 3 to 4 cm. long; seeds prominently winged. 3. P. murrayana.

Leaves 10 to 25 cm. long, commonly in 3's.
Cones oval, 8 to 15 cm. long; leaves 12 to 25 cm. long__4. P. ponderosa.
Cones rounded-oval, 6 to 9 cm. long; leaves 10 to 15 cm. long.
5. P. brachyptera.

Leaves in 5's.
Cone scales with prickles. Leaves 2 to 4 cm. long, curved and crowded.
6. P. aristata.

Cone scales without prickles.
Leaves entire, 3 to 5 cm. long; cones sessile or nearly so.
Cones subcylindric or oval, 7 to 12 cm. long, light brown.
7. P. flexilis.
Cones oval, 3.5 to 7 cm. long, purple-brown_____8. P. albicaulis.
Leaves serrulate, 5 to 10 cm. long; cone stalked, cylindric. Trees 15 to 75 meters high.
Cones 25 cm. long or more_____9. P. lambertiana.
Cones 15 to 20 cm. long. Leaves very slender_____10. P. monticola.

1. Pinus monophylla Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 319. *pl. 4.* 1845. SINGLELEAF PINYON.

Forming a characteristic belt at an elevation of 1,200 meters and upward to 2,400 meters or more. Western Utah to California.

2. Pinus edulis Engelm. in Wisliz. Mem. North. Mex. 88. 1848. PINYON.

Forming a characteristic belt at an elevation of 1,200 meters and upward to 2,000 meters. Colorado and Utah, southward to Texas and northern Mexico.

Pinus monophylla is distinguished from *Pinus edulis* by the number of resin ducts in the leaves. In the former the number is normally eight (sometimes less), in the latter two in each leaf. Two-leaved forms of *Pinus monophylla* occur in western and southern Utah; these are recognized by three or four ducts in each leaf. Occasionally one-leaved forms of *Pinus edulis* are found, but these can readily be distinguished from *Pinus monophylla* by the number of ducts.

Both species yield the pinyon nut, one of the most valued foods of the Indians.

3. Pinus murrayana Balf. in Murray, Bot. Exped. Oreg. *pl. 3, f. 2.* 1853.
LODGEPOLE PINE.

Aspen and spruce belts, Uinta Mountains; abundant in the Sierra Nevada about Lake Tahoe. Alaska to Colorado and Sierra Nevada.

This pine is locally known as tamarack.

4. Pinus ponderosa Dougl.; P. Laws. Agr. Man. 354. 1836.
WESTERN YELLOW PINE.

Forming a characteristic belt in the Sierra Nevada at an elevation of 1,500 meters and upward.

5. Pinus brachyptera Engelm. in Wisliz. Mem. North. Mex. 89. 1848.
ROCKY MOUNTAIN YELLOW PINE.

Pinus ponderosa scopulorum Engelm. in S. Wats. Bot. Calif. **2**: 126. 1880.

Forming forests on sunny plateaus and slopes at an elevation of 2,400 meters or more. South Dakota to Montana, Nevada, Arizona, and Mexico.

6. Pinus aristata Engelm. Trans. Acad. St. Louis **2**: 205. *pl. 5, 6.* 1863. Amer. Journ. Sci. II. **34**: 331. 1862. BRISTLECONE PINE.

Aspen belt, upward to the alpine slopes. Colorado and New Mexico to Nevada and California.

7. Pinus flexilis James in Long, Exped. **2**: 34. 1823. LIMBER PINE.

Aspen and spruce belts (sometimes at lower elevations); reduced to an undershrub in high exposed situations. In Central Nevada it is one of the characteristic trees above the *Cercocarpus ledifolius* areas. Alberta to northern Mexico and California.

The cross section of the leaf of *Pinus aristata* is usually marked by one epidermal resin duct along the arc, and that of *P. flexilis* by two ducts.

8. Pinus albicaulis Engelm. Trans. Acad. St. Louis **2**: 209. 1863.

WHITEBARK PINE.

In the spruce belt, upward to the subalpine slopes, where it is reduced to an undershrub. British Columbia to Oregon and southern California.

9. Pinus lambertiana Dougl. Trans. Linn. Soc. **15**: 500. 1827. SUGAR PINE.

Slopes of Sierra Nevada about Lake Tahoe. Oregon, California, and western Nevada.

10. Pinus monticola Dougl.; Lambert, Descr. Pinus. ed. 2. **3**: 27. *pl.* 87. 1837. WESTERN WHITE PINE.

Slopes of the Sierra Nevada, at 1,800 to 3,000 meters. British Columbia to Montana and California.

The white pine of eastern North America, *Pinus strobus*, is the floral symbol of Maine.

2. PICEA Link. SPRUCE

Branchlets glabrous; cones 5 to 9 cm. long_____1. **P. pungens.**
Branchlets pubescent; cones 3 to 5 cm. long_____2. **P. engelmanni.**

1. Picea pungens Engelm. Gard. Chron. II. **11**: 334. 1879.

COLORADO SPRUCE.

Abies menziesii parryana André, Ill. Hort. **23**: 198. 1876.
Picea parryana Sarg. Silv. N. Amer. **12**: 47. *pl. 600*. 1898.

Canyons and along watercourses of the pinyon and aspen belts. Wyoming to New Mexico and Arizona.

2. Picea engelmanni Parry in Engelm. Trans. Acad. St. Louis **2**: 212. 1863.

ENGELMANN SPRUCE.

Forming a characteristic belt at an elevation of 2,700 meters and upward to timber line. British Columbia to New Mexico and Arizona.

3. TSUGA Carr. HEMLOCK

1. Tsuga mertensiana (Bong.) Carr. Trait. Conif. nouv. ed. 250. 1867.

MOUNTAIN HEMLOCK.

Pinus mertensiana Bong. Mém. Acad. St. Pétersb. VI. **2**: 163. 1833.

Mountain sides at 2,500 meters or more in the Sierra Nevada, near Carson City. Alaska to Montana, Nevada, and California.

4. PSEUDOTSUGA Carr. DOUGLAS-FIR

1. Pseudotsuga mucronata (Raf.) Sudw. Contr. U. S. Nat. Herb. **3**: 266. 1895.

Abies mucronata Raf. Atl. Journ. **1**: 120. 1832.
Abies douglasii Lindl. Penny Cycl. **1**: 32. 1833.

Aspen belt, upward to the alpine slopes. Alaska to western Texas, California, and northern Mexico.

5. ABIES Link. Fir

Leaves somewhat tetragonal, bluish green, curved and crowded, 2 to 4 cm. long. Cones oblong-cylindric, 10 to 20 cm. long, dull purple.
3. A. magnifica.

Leaves flat, bluish green and glaucous.
Resin ducts along the epidermis; leaves of the lower branches 5 to 7 cm. long; cones oblong-cylindric, yelowish green, 7 to 12 cm. long___**1. A. concolor.**
Resin ducts within the parenchyma; leaves of the lower branches 2.5 to 4 cm. long; cones oblong, dark purple, 5 to 10 cm. long_____**2. A. lasiocarpa.**

1. Abies concolor Lindl. Journ. Hort. Soc. Lond. **5**: 210. 1850. White fir.
Upper pinyon belt, upward to the lower spruce belt. Colorado and New Mexico to Oregon and California.

2. Abies lasiocarpa (Hook.) Nutt. N. Amer. Sylv **3**: 138. 1849. Subalpine fir.
Pinus lasiocarpa Hook. Fl. Bor. Amer. **2**: 163. 1839.
Spruce belt, rarely at lower elevations. Alaska to New Mexico and Arizona.

3. Abies magnifica Murray, Proc. Hort. Soc. Lond. **3**: 318. 1863. Red fir.
Slopes and ridges at an elevation of 1,500 to 2,700 meters; Sierra Nevada. Southern Oregon to Greenhorn Mountains, California.

6. LIBOCEDRUS Endl. Incense-cedar

1. Libocedrus decurrens Torr. Pl. Frém. **7**. *pl.* **3**. 1853.
California incense-cedar.
Slopes and canyons of the Sierra Nevada, at 1,500 to 2,100 meters. Oregon to western Nevada and Lower California.

7. JUNIPERUS L. Juniper

Plant a prostrate shrub; leaves awl-shaped, spreading, white-glaucous above, opposite or ternate; catkins axillary. Fruit bright blue, 3 to 5 mm. in diameter_____**1. J. sibirica.**
Plants erect shrubs or small trees; leaves scalelike (of two forms), appressed, mostly opposite; catkins terminal on short branches.
Leaves entire, acute or acuminate, usually with an oblong obscure gland on the back. Fruit dark blue, with a bloom, about 5 mm. in diameter; branchlets slender, drooping_____**2. J. scopulorum.**
Leaves serrulate.
Leaves conspicuously glandular on the back, in 2's or 3's, acute or acuminate; fruit 6 to 8 mm. in diameter, blue-black, glaucous.
3. J. occidentalis.
Leaves not glandular, or only obscurely so; fruit copper-colored, 1-seeded.
Leaves acute or obtuse; fruit 7 to 10 mm. in diameter.
4. J. utahensis.
Leaves acute or acuminate; fruit 5 to 7 mm. in diameter.
5. J. monosperma.

1. Juniperus sibirica Burgsd. "Anleit. Holz. **2**: 124. 1787"; ed. 2. 127. 1791.
Mountain juniper.
Upper pinyon belt, upward to 3,300 meters; Utah and eastern Nevada and in the Sierra Nevada. Alaska to Greenland, southward in the Rocky Mountains to New Mexico and in the Sierra Nevada to Mono Pass; also in Siberia.

2. Juniperus scopulorum Sarg. Gard. & For. **10:** 420. 1897.

COLORADO JUNIPER.

Foothills and on mountain sides, upward to 2,700 meters. Alberta to British Columbia, southward to New Mexico, Arizona, and Nevada.

3. Juniperus occidentalis Hook. Fl. Bor. Amer. **2:** 166. 1839.

WESTERN JUNIPER.

Sierra Nevada at 1,800 meters, and upward to timber line. Idaho and Washington, southward to western Nevada and San Bernardino Mountains, California.

4. Juniperus utahensis (Engelm.) Lemmon, Calif. Board For. Rep. **3:** 183. 1890.

UTAH JUNIPER.

Juniperus californica utahensis Engelm. Trans. Acad. St. Louis **3:** 588. 1877.

Characteristic tree of the pinyon belt, throughout Utah and Nevada. Southwestern Wyoming to Nevada, southward to New Mexico and southeastern California.

5. Juniperus monosperma (Engelm.) Sarg. Silv. N. Amer. **10:** 89. *pl. 522.*

CHERRYSTONE JUNIPER.

Juniperus occidentalis monosperma Engelm. Trans. Acad. St. Louis **3:** 590. 1877.

The characteristic juniper of northern Arizona, extending northward into southern Utah and Nevada. Southern Colorado to southern Nevada, southward into Mexico.

8. GNETACEAE. Jointfir Family

Shrubs (our species) with opposite or ternate, jointed branches; leaves opposite or ternate, scalelike; flowers mostly dioecious, in axillary aments, the staminate with 2 to 8 monadelphous stamens, solitary at the base of each bract, the pistillate solitary or in pairs in the upper part of the ament; ovules erect, solitary, developing into a nutlet or false drupe.

1. EPHEDRA L. JOINTFIR

Scales distinct, 6 to 12 mm. long ..... **4. E. trifurca.**
Scales connate below, 3 to 5 mm. long.
  Branches fastigiate, yellowish green ..... **1. E. viridis.**
  Branches spreading, olive-green.
    Branches, scales, and bracts ternate; fruiting aments sessile, with rounded, clawed, very thin bracts ..... **2. E. torreyana**
    Branches, scales, and bracts opposite; fruiting aments stalked, with firm ovate acute scarious bracts ..... **3. E. nevadensis.**

1. Ephedra viridis Coville, Contr. U. S. Nat. Herb. **4:** 220. 1893.

Pinyon belt, upward to 2,400 meters. Utah to southeastern California and New Mexico.

2. Ephedra torreyana S. Wats. Proc. Amer. Acad. **14:** 299. 1879.

Canyons and hillsides of the artemisia and Covillea belts. Southern Colorado (?) to southern California, southward to Mexico.

3. Ephedra nevadensis S. Wats. Proc. Amer. Acad. **14:** 298. 1879.

Artemisia and lower pinyon belts, rare at lower elevations. Utah to California and northern Mexico.

4. Ephedra trifurca Torr. in Emory, Mil. Reconn. 152. 1848.

Covillea belt; Congress Junction, Arizona; reported from Utah, but perhaps out of our range. California to Texas and Mexico.

9. TYPHACEAE. Cattail Family

Tall monoecious marsh plants with creeping rootstocks; leaves linear, plano-convex; flowers in spikes, the staminate uppermost, terminating the stems; perianth consisting of bristles or hairs; staminate flowers with 3 or more stamens, the pistillate with a 1-celled 1-ovuled ovary; style persistent; stigma one-sided; fruit nutlike, small.

1. TYPHA L. Cattail

Spikes of the staminate and pistillate flowers usually contiguous; leaves 1 cm. broad or more; stigma rhombic-lanceolate ..... 1. T. latifolia.
Spikes of the staminate and pistillate flowers distant; leaves about 5 mm. broad; stigma linear ..... 2. T. angustifolia.

1. **Typha latifolia** L. Sp. Pl. 971. 1753. Common cattail.

In marshes and streams of the Great Basin. Throughout most of North America; also in the Old World.

2. **Typha angustifolia** L. Sp. Pl. 971. 1753. Narrowleaf cattail.

Marshes and wet places; Grand Canyon and Sevier County, Utah. Southern Maine to North Carolina and California; also in the Old World.

10. SPARGANIACEAE. Bur-reed Family

Monoecious marsh or aquatic plants with creeping rootstocks; stem simple or branching; leaves linear, entire, sheathing at base; flowers in heads, the upper ones staminate; staminate flowers consisting of 3 or more stamens, subtended by scales or bracts; pistillate flowers of one sessile 1-celled ovary, subtended by a perianth of 3 to 6 spatulate scales; fruit obovoid or fusiform, 1 or 2-seeded.

1. SPARGANIUM L. Bur-reed

Inflorescence branching; fruiting heads 2 cm. or more in diameter; leaves 12 to 15 mm. wide. Achenes abruptly beaked ..... 1. S. eurycarpum.
Inflorescence simple; fruiting heads 1 to 1.5 cm. in diameter; leaves 2 to 9 mm. wide, thin, flat.
Stipe and beak of fruit 1 mm. long or less; fruiting heads about 1 cm. broad ..... 2. S. minimum.
Stipe and beak of fruit 2 mm. long or more; fruiting heads about 1.5 cm. broad ..... 3. S. angustifolium.

1. **Sparganium eurycarpum** Engelm. in A. Gray, Man. ed. 2. 430. 1856.

Marshes and streams of the artemisia, pinyon, and aspen belts. Newfoundland to British Columbia, southward to Virginia, Utah, and California.

2. **Sparganium minimum** Fries, Summ. Veg. Scand. 2: 560. 1849.

In ponds of the spruce and alpine belts. New Brunswisk to British Columbia, southward to Pennsylvania, Utah, and Oregon; also in Europe and Asia.

3. **Sparganium angustifolium** Michx. Fl. Bor. Amer. 2: 189. 1803.

In streams and lakes, upward to the subalpine belt. Newfoundland to British Columbia, California, and Pennsylvania.

11. POTAMOGETONACEAE. Pondweed Family

Aquatic plants with jointed, often branching stems; leaves sheathing at base or stipulate; flowers monoecious or perfect, in axillary clusters or spikes; perianth none; stamens 1 to 4 or more; ovaries 1 to 4, distinct, 1-celled, 1-ovuled; fruit drupes or achenes.

Leaves opposite, filiform, 3 to 7 cm. long; flowers monoecious, sessile, the staminate consisting of 1 stamen, the pistillate 2 or more in a cup-shaped involucre. Fruit nutlike, beaked, 2 to 4 mm. long; slender branching herbs with rhizomes----------3. **ZANNICHELLIA.**

Leaves alternate; flowers perfect.

Stamens 4; ovaries 4, distinct, sessile; leaves often of two kinds, floating and submerged, similar or dissimilar----------1. **POTAMOGETON.**

Stamens 2, sessile; ovaries 4, distinct, sessile at first, long-stipitate in fruit; leaves filiform, 2 to 10 cm. long, 1-nerved, with scarious sheaths.

2. RUPPIA.

1. POTAMOGETON L. PONDWEED

Floating leaves present, broad. Stipules free.

Submerged leaves without blades. Floating leaves oval or ovate, rounded or cordate, 21 to 29-nerved, 5 to 10 cm. long; fruit about 4 mm. long.

1. P. natans.

Submerged leaves with proper blades.

Submerged leaves linear, 1 to 5 cm. long. Floating leaves oval, rounded or subcordate, 2 to 5 cm. long; fruit obovoid, 2 to 3 mm. long, indistinctly 3-keeled----------**4. P. heterophyllus.**

Submerged leaves lanceolate.

Submerged leaves petioled; floating leaves elliptic, 15 cm. long or less, 11 to 23-nerved; fruit obovoid, 3-keeled----------**2. P. americanus.**

Submerged leaves sessile, the uppermost sometimes short-petioled; floating leaves oblong to spatulate, 5 to 12 cm. long, 11 to 17-nerved; fruit lenticular, 3-keeled----------**3. P. alpinus.**

Floating leaves absent.

Leaves oblong or lanceolate.

Leaves not clasping, elliptic to oval, 5 to 20 cm. long, about 13-nerved. Fruit roundish, 3 mm. long----------**6. P. lucens.**

Leaves more or less clasping.

Leaves lanceolate to ovate-lanceolate, 13 to 23-nerved; fruit about 4 mm. long, obscurely 3-keeled----------**5. P. richardsonii.**

Leaves elongate-lanceolate, 5 to 30 cm. long, with 3 to 5 principal nerves; fruit obovoid, 4 mm. long----------**7. P. praelongus.**

Leaves linear to capillary.

Stipules free.

Leaves with glands at base, 3-nerved; fruit ellipsoid, 2 mm. long; spike 3 to 10-flowered----------**8. P. pusillus.**

Leaves without glands at base, obscurely 3-nerved; fruit orbicular, 2 mm. long; spike about 4-flowered----------**9. P. foliosus.**

Stipules adnate to base of leaf.

Leaves 2 to 4 mm. broad, 3 to 5-nerved. Fruit reticulate, 3 mm. long.

10. P. latifolius.

Leaves filiform or nearly so.

Stigma broad, sessile----------**11. P. interior.**

Stigma capitate; style evident----------**12. P. pectinatus.**

1. Potamogeton natans L. Sp. Pl. 126. 1753.

In still waters of the artemisia belt and upward. North America, Europe, and Asia.

2. Potamogeton americanus Schlecht. & Cham. Linnaea **2**: 226. *pl. 6. f. 26.* 1827.

In ponds and streams of the artemisia belt, upward to the spruce belt. North America except in the extreme north.

3. Potamogeton alpinus Balb. Mém. Acad. Turin **12**: 329. 1803.

In ponds of the aspen and spruce belts. Nova Scotia to Alaska, southward to New Jersey and California; also in the Old World.

4. Potamogeton heterophyllus Schreb. Spic. Fl. Lips. 21. 1771.

In ponds and lakes; Ruby Lake, Nevada, at 1,800 meters. Throughout North America; Europe.

5. Potamogeton richardsonii (Bennett) Rydb. Bull. Torrey Club **32**: 599. 1905.

Potamogeton perfoliatus richardsonii Bennett, Journ. Bot. Brit. & For. **27**: 25. 1889.

In pools and lakes, upward to 2,700 meters. New York to Delaware, California, and Alaska.

6. Potamogeton lucens L. Sp. Pl. 126. 1753.

About warm springs and in pools, rivers, and lakes; Wyoming. North America, Europe, Asia, and northern Africa.

7. Potamogeton praelongus Wulf. Archiv. Bot. Roemer III. **3**: 331. 1805.

In ponds and streams; Fish Lake, Utah. Nova Scotia to New Jersey, westward to British Columbia and California; also in Europe.

8. Potamogeton pusillus L. Sp. Pl. 127. 1753.

In ponds and streams, at 1,200 meters and upward. Novia Scotia to Virginia, California, and Alaska; also in Europe.

9. Potamogeton foliosus Raf. Med. Repos. N. Y. II. **5**: 354. 1808.

In ponds and ditches at 1,200 to 3,000 meters. North America.

10. Potamogeton latifolius (Robbins) Morong, Mem. Torrey Club **3**: 52. *pl. 59.* 1893.

Potamogeton pectinatus latifolius Robbins; S. Wats. in King, Geol. Expl. 40th Par. **5**: 338. 1871.

In ponds and lakes of the artemisia belt, upward to 1,800 meters. Nevada and adjacent California, Oregon, and Idaho.

11. Potamogeton interior Rydb. Colo. Agr. Exp. Sta. Bull. **100**: 13. 1906.

In lakes and pools of the artemisia belt, upward to the spruce belt. Ontario to Alaska, southward to Colorado and Nevada.

12. Potamogeton pectinatus L. Sp. Pl. 127. 1753.

Fresh or saline lakes and ponds of the Covillea belt, upward to the aspen belt. New Brunswick to Florida, California, and Alaska; also in Europe.

2. RUPPIA L. WIDGEONGRASS

Stem slender, elongate; fruit very oblique, 2 mm. long or less; the beak 0.5 to 1 mm. long ..... **1. R. maritima.**

Stem intricately branched, very leafy; fruit scarcely oblique, 2 mm. long or less, without a beak ..... **2. R. pectinata.**

1. Ruppia maritima L. Sp. Pl. 127. 1753.

In brackish ponds; northern Utah and Nevada. Newfoundland to Alaska, southward to South America; also in Europe and Asia.

2. Ruppia pectinata Rydb. Mem. N. Y. Bot. Gard. **1**: 18. 1900.

In brackish ponds. Wyoming to Utah, Washington, and California.

3. ZANNICHELLIA L. Hornpondweed

1. Zannichellia palustris L. Sp. Pl. 969. 1753.

In pools and ditches of the Covillea, artemisia, and pinyon belts. Ontario to Florida, westward to British Columbia and California; also in Europe and Asia.

12. NAJADACEAE. Naiad Family

Submerged fresh or salt water herbs with slender branching stems; leaves alternate or opposite, stipulate; flowers solitary, axillary, monoecious or dioecious; staminate flowers consisting of a stamen enclosed in a membranous spathe, the pistillate with a single ovary with short style; stigmas 2 to 4; fruit a sessile drupelet.

1. NAJAS L. Naiad

Leaves broadly linear, coarsely and spinescently toothed; plant dioecious; stem stout, compressed, armed with broad teeth; fruit 4 to 5 mm. long, rugose-reticulate ..... 1. N. marina.

Leaves narrowly linear, more or less serrulate; plant monoecious; stem not armed; fruit about 2 mm. long, reticulate ..... 2. N. guadalupensis.

1. Najas marina L. Sp. Pl. 1015. 1753.

About salt springs and marshes; Ash Meadows, Nevada. New York to Florida, westward to California; also in the Old World.

2. Najas guadalupensis (Spreng.) Morong, Mem. Torrey Club 3: 60. 1893.
Caulinia guadalupensis Spreng. Syst. Veg. 1: 20. 1825.

Floating in water. Nebraska to Oregon, Florida, and Tropical America.

13. SCHEUCHZERIACEAE. Arrowgrass Family

Marsh plants with narrow bladeless leaves; flowers perfect, spicate or racemose; perianth 4 to 6-parted; stamens 3 to 6; ovaries 3 to 6, 1 or 2-ovuled, separating at maturity into as many follicles or capsules.

1. TRIGLOCHIN L. Arrowgrass

Fruit ovoid, obtuse at base, 3 to 5 mm. long, 6-carpelled; plant stout, 1 meter high or less; leaves over 2 mm. broad; racemes crowded; pedicels decurrent, 2 to 3 mm. long ..... 1. T. maritima.

Fruit clavate, 6 to 7 mm. long, 3-carpelled; plants slender, 10 to 30 cm. high; leaves less than 2 mm. broad; racemes not crowded; pedicels capillary. ..... 2. T. palustris.

1. Triglochin maritima L. Sp. Pl. 339. 1753.

Alkaline meadows, marshes, and borders of lakes of the artemisia and pinyon belts. Labrador to New Jersey, California, and Alaska; also in Europe and Asia.

2. Triglochin palustris L. Sp. Pl. 338. 1753.

Alkaline meadows of the artemisia belt. North and South America, Europe, and Asia.

14. ALISMACEAE. Waterplantain Family

Scapose marsh plants with long-petioled leaves; flowers regular, in racemes or panicles; sepals 3, persistent; petals 3, fugacious; ovaries few to many, 1-celled, 1-ovuled; fruit an aggregation of achenes.

Leaf blades ovate or oblong; inflorescence paniculate or umbellate-paniculate; flowers perfect; ovaries in a ring on a flat receptacle; perennials, 30 cm. high or more, from proliferous corms_____1. **ALISMA.**

Leaf blades sagittate; inflorescence raceme-like; flowers monoecious or dioecious; ovaries on a convex receptacle; stoloniferous perennials.

2. SAGITTARIA.

1. ALISMA L. Waterplantain

Leaf blades ovate, 3 to 9-ribbed_____1. **A. plantago-aquatica.**

Leaf blades oblong or oblong-lanceolate_____2. **A. geyeri.**

1. Alisma plantago-aquatica L. Sp. Pl. 342. 1753.

Alisma brevipes Greene, Pittonia **4**: 158. 1900.

In wet places, edges of marshes and lakes, upward to 3,000 meters. North America; also in Europe and Asia.

2. Alisma geyeri Torr. in Nicoll. Rep. Miss. 162. 1843.

Alisma validum Greene, Pittonia **3**: 115. 1896.

In wet places, edges of marshes and lakes, artemisia and pinyon belts. New York to North Dakota. Oregon, and Nevada.

2. SAGITTARIA L. Arrowhead

Bracts lanceolate or linear-lanceolate; beak of achene short, erect.

1. S. cuneata.

Bracts ovate; beak of achene triangular-lanceolate, horizontal.

2. S. latifolia.

1. Sagittaria cuneata Sheld. Bull. Torrey Club **20**: 283. *pl. 159*. 1893.

Sagittaria arifolia Nutt.; J. G. Smith, Rep. Mo. Bot. Gard. **6**: 32. 1895.

In shallow water and ditches at 1,200 to 1,500 meters. Maine to British Columbia, southward to Connecticut, New Mexico, and California.

2. Sagittaria latifolia Willd. Sp. Pl. **4**: 409. 1805.

In shallow water, swamps, and meadows; Sierra Nevada. New Brunswick to British Columbia, Central America, and Florida.

15. VALLISNERIACEAE. Tapegrass Family

Mostly dioecious aquatics; leaves (in our species) opposite or whorled; flowers regular, sessile or on a scapelike peduncle from a spathe; perianth 3 or 6-parted; stamens 3 to 12 (9 in our species); ovary 1-celled, with 3 parietal placentae; styles 3, with entire or 2-cleft stigmas; fruit coriaceous, oblong, few-seeded.

1. ELODEA Michx.

1. Elodea canadensis Michx. Fl. Bor. Amer. **1**: 20. 1803. Waterweed.

Philotria planchonii Rydb. Bull. Torrey Club **35**: 462. 1908.

In pools and lakes; Panguitch; Wadsworth. Throughout most of North America.

16. POACEAE. Grass Family

(Contributed by Mrs. Agnes Chase)

Subfamily 1. Panicatae

Spikelets with 1 perfect terminal floret (disregarding the staminate and neuter spikelets) and (except in *Hilaria*) a sterile or staminate floret below, usually represented by a sterile lemma only, one glume sometimes wanting; articulation below the spikelets either in the pedicel, in the rachis, or at the base

of a cluster of spikelets, the spikelets falling entire, either singly, in groups, or together with joints of the rachis; spikelets, or at least the fruits, more or less dorsally compressed (except in *Hilaria*).

Glumes indurate; fertile lemma and palea hyaline or membranaceous, the sterile lemma (when present) like the fertile one in texture.

Spikelets in pairs, one sessile, the other pedicellate (the pedicellate one sometimes obsolete); lemmas hyaline_____1. **ANDROPOGONEAE.**

Spikelets in groups of 3, 1 perfect and 2 staminate, sessile on the continuous axis, the groups falling entire_____2. **NAZIEAE.**

Glumes membranaceous; fertile lemma and palea indurate or at least firmer than the glumes; sterile lemma like the glumes in texture.

3. PANICEAE.

Subfamily 2. Poatae

Spikelets 1 to many-flowered, the reduced florets, if any, above the perfect florets (except in Phalarideae); articulation usually above the glumes; spikelets usually more or less laterally compressed.

Spikelets with 2 sterile or rudimentary lemmas unlike and below the indurate lemma; no sterile or rudimentary florets above_____5. **PHALARIDEAE.**

Spikelets without sterile lemmas below the perfect floret.

Spikelets articulate below the glumes, 1-flowered, very flat, the lemma and paleas about equal, both keeled, the glumes small or wanting.

4. ORYZEAE.

Spikelets usually articulate above the glumes, if below, the glumes well developed.

Spikelets sessile (short-pedicellate in *Leptochloa*) on a continuous or jointed rachis.

Spikelets on one side of the continuous rachis; spikes usually more than 1, digitate or racemose_____8. **CHLORIDEAE.**

Spikelets on opposite sides of the continuous or jointed rachis; spikes terminal, single_____10. **HORDEAE.**

Spikelets pedicellate in open or contracted (sometimes spikelike) panicles.

Spikelets 1-flowered (rarely 2-flowered in *Sporobolus asperifolius*).

6. AGROSTIDEAE.

Spikelets 2 to many-flowered.

Glumes as long as the lowest floret, usually as long as the spikelet; lemmas awned from the back (spikelets awnless in *Koeleria*, *Sphenopholis*, and *Trisetum wolfii*)_____7. **AVENEAE.**

Glumes shorter than the first floret; lemmas awnless or awned from the tip (from a bifid apex in *Bromus* and *Triodia*).

9. FESTUCEAE.

1. ANDROPOGONEAE

Inflorescence a silky slender spikelike panicle; spikelets all fertile, surrounded by copious soft hairs; culms simple_____1. **IMPERATA.**

Inflorescence not a spikelike panicle, the spikelets in racemes, these solitary, fascicled, or forming a panicle; spikelets unlike, the sessile perfect, the pedicellate staminate or neuter, sometimes obsolete.

Racemes of several to many joints, sessile on the peduncle or common axis.

2. ANDROPOGON.

Racemes reduced to 1 or few joints, terminal on filiform branches, forming an elongate panicle_____3. **SORGHASTRUM.**

2. NAZIEAE

Spikelets sessile, 1 perfect and 2 staminate, the clusters appressed to the common axis, forming a spike----------4. **HILARIA.**

3. PANICEAE

Spikelets subtended or surrounded by 1 to many bristles (sterile branchlets), these distinct or connate.

Bristles slender, distinct, persistent, the spikelets deciduous; inflorescence a bristly spikelike panicle----------9. **CHAETOCHLOA.**

Bristles united, forming a spiny subglobose bur, falling with the spikelets inclosed, the burs sessile on a slender axis----------10. **CENCHRUS.**

Spikelets not subtended by bristles.

Inflorescence of few to several slender digitate racemes, the spikelets subsessile along one side of the rachis.

Racemes few to several; lemma with flat hyaline pale margins.

5. SYNTHERISMA.

Racemes 2, conjugate, rarely a third below; lemma margins firm.

6. PASPALUM.

Inflorescence not of slender digitate racemes.

Spikelets awned or mucronate, crowded in 1-sided branches. Plants annual----------8. **ECHINOCHLOA.**

Spikelets awnless, in open or contracted panicles, if contracted the spikelets blunt----------7. **PANICUM.**

4. ORYZEAE

Spikelets subimbricate in short racemes, these borne on slender branches of an open panicle; blades very rough----------11. **HOMALOCENCHRUS.**

5. PHALARIDEAE

Inflorescence a dense, narrow or spikelike panicle; sterile florets minute.

12. PHALARIS.

Inflorescence an open panicle; sterile florets larger than the fertile floret, staminate----------13. **TORRESIA.**

6. AGROSTIDEAE

Fruit indurate, terete, awned, the nerves obscure; callus usually well developed, oblique, bearded.

Awn 3-fid, the lateral divisions sometimes short, no distinct line of demarcation between the awn and lemma. Plants mostly less than 50 cm. tall----------14. **ARISTIDA.**

Awn simple, a distinct line of demarcation between the awn and lemma.

Awn persistent, twisted, several to many times longer than the slender fruit; callus sharp-pointed; plants often tall----------15. **STIPA.**

Awn deciduous, not twisted, not more than 3 or 4 times longer than the plump fruit; callus minute, blunt; plants mostly less than 50 cm. tall.

16. ORYZOPSIS.

Fruit thin or firm but not indurate or terete, the nerves evident.

Glumes shorter than the lemma (the awn tips longer in *Muhlenbergia racemosa*).

Lemmas awned from the tip or mucronate, 3-nerved.

17. MUHLENBERGIA.

Lemmas awnless.
Lemmas 1-nerved, thin; fruit at maturity falling from the lemma and palea; seed loose in the pericarp, this splitting at maturity.
20. SPOROBOLUS.
Lemmas 3-nerved; lemma and palea falling with the grain enclosed; pericarp adherent.
Nerves of lemmas densely silky-villous; panicle narrow but loose, not elongate ---- **21. BLEPHARONEURON.**
Nerves of lemma not villous; panicle dense, elongate, spikelike.
22. EPICAMPES.

Glumes longer than the lemma.
Panicles dense, spikelike, cylindric or nearly so; spikelets strongly flattened.
Glumes abruptly mucronate, stiffly ciliate on the keels, persistent after the fall of the floret; lemma awnless ---- **18. PHLEUM.**
Glumes not mucronate, silky-ciliate on the keel; spikelets falling entire; lemma awned ---- **19. ALOPECURUS.**
Panicles open or contracted, but not cylindric or nearly so.
Glumes awned, the awn longer than the body; introduced weeds.
Panicle dense, lobed; spikelets falling entire ---- **23. POLYPOGON.**
Glumes awnless or minutely awn-tipped; mostly natives.
Spikelets falling entire; floret stipitate. Rachilla prolonged behind the palea; tall wood grass with drooping panicle ---- **24. CINNA.**
Spikelets not falling entire, the glumes persistent; floret not stipitate.
Florets naked at base or with short hairs; palea obsolete in most species ---- **25. AGROSTIS.**
Florets with hairs at base at least half as long as the lemma; palea present, the rachilla prolonged behind the palea.
26. CALAMAGROSTIS.

7. AVENEAE

Spikelets awnless or the upper lemma mucronate; glumes shorter than the lowest floret. Panicles dense, narrow.
Second glume broad and blunt at summit; spikelets falling entire.
30. SPHENOPHOLIS.
Second glume acuminate, like the first; florets falling from the persistent glumes ---- **31. KOELERIA.**
Spikelets awned (awnless in one species of *Trisetum*); glumes exceeding at least the lowest floret.
Florets 2, one perfect, the other staminate. Introduced genera.
Lower floret fertile, awnless; awn of upper floret hooked, short.
27. NOTHOLCUS.
Lower floret staminate, with a twisted geniculate exserted awn.
33. ARRHENATHERUM.
Florets 2 or more, all alike.
Spikelets not over 8 mm. long.
Lemmas convex, the summit erose, awned from below the middle.
28. AIRA.
Lemmas keeled, bidentate, awned from above the middle.
29. TRISETUM.
Spikelets 15 mm. long or more. Glumes exceeding all the florets.
Lemmas awned from below the middle, the awn not flattened; spikelets nodding ---- **32. AVENA.**

Lemmas awned from between the teeth of a bifid apex, the awn flat, twisted; spikelets on stiff pedicels, not nodding.
34. DANTHONIA.

8. CHLORIDEAE

Spikelets with 3 or more perfect florets—39. LEPTOCHLOA.
Spikelets with but 1 perfect floret, often with modified florets above.
Spikes slender, digitate—35. CAPRIOLA.
Spikes relatively thick, racemose or solitary.
Spikelets with a modified awned floret above the perfect one; spikes spreading or reflexed—37. BOUTELOUA.
Spikelets with a perfect floret only, falling entire; spikes erect.
Glumes unequal, narrow, pointed; plants perennial, native.
36. SPARTINA.
Glumes equal, broad, boat-shaped, the spikelet subcordate; plants annual, introduced—38. BECKMANNIA.

9. FESTUCEAE

Panicles plumelike, 30 cm. long or more, the florets obscured by long silky hairs; tall reeds—41. PHRAGMITES.
Panicles not plumelike; florets not obscured by hairs or, if so, the panicle not over 2 cm. long; not reeds.
Inflorescence capitate, hidden among the spiny-pointed leaves. Plants annual, forming mats—40. MUNROA.
Inflorescence an open or contracted panicle; leaves not spiny-pointed.
Lemmas distinctly 3-nerved.
Nerves of the lemma silky-villous; lemma short-awned from the toothed apex—42. TRIODIA.
Nerves of the lemma glabrous; lemma awnless.
Lemmas broad, obtuse, hyaline at apex; spikelets 2-flowered.
44. CATABROSA.
Lemmas acute or acuminate, not hyaline at apex; spikelets few to many-flowered—43. ERAGROSTIS.
Lemmas 5 to many-nerved, the nerves sometimes obscure.
Plants dioecious; lemmas smooth, firm, the nerves indistinct. Panicles contracted, mostly not over 5 cm. long—46. DISTICHLIS.
Plants not dioecious (except in some species of *Poa* with pubescent lemmas).
Spikelets strongly compressed, crowded in 1-sided clusters at the end of stiff naked panicle branches—47. DACTYLIS.
Spikes not strongly compressed, not in 1-sided clusters.
Lemmas keeled on the back. Spikelets not over 10 mm. long, mostly much smaller, awnless; blades boatshaped at tip.
48. POA.
Lemmas rounded on the back (slightly keeled toward the summit in *Festuca* and species of *Bromus*).
Glumes papery; upper florets sterile, folded together, forming a small club-shaped rudiment behind the uppermost palea.
Lemmas firm, scarious-margined—45. MELICA.
Glumes not papery; upper florets similar to the others.
Lemmas obtuse, the nerves not converging at apex.
Nerves of lemma prominent; plants rather tall.
49. PANICULARIA.

Nerves of lemma faint; plants relatively low.
50. **PUCCINELLIA.**
Lemmas acute or awned, the nerves converging at apex.
Lemmas entire, awned from the tip or pointed.
51. **FESTUCA.**
Lemmas awned or awn-tipped from a minutely 2-toothed apex.
52. **BROMUS.**

10. HORDEAE

Spikelets solitary at each joint of the rachis. Florets few to several (occasionally 2 in *Agropyron*).
Spikelets placed edgewise to the rachis; first glume wanting except in the terminal spikelet; introduced ..... 53. **LOLIUM.**
Spikelets placed flatwise to the rachis; both glumes present, distinctly nerved, broadened above the base; natives ..... 54. **AGROPYRON.**
Spikelets or some of them 2 or 3 at each joint of the rachis, or, if solitary, the glumes subulate, tapering from base to apex, the nerves not visible.
Spikelets 1-flowered, in 3's, the lateral pair pediceled, reduced to awns.
Axis readily disjointing ..... 55. **HORDEUM.**
Spikelets 2 to 6-flowered, usually in 2's, all alike.
Axis not disarticulating (except in *E. macounii*, with erect awns); glumes and lemmas awnless or awned, the awns not forking ..... 56. **ELYMUS.**
Axis disarticulating; glumes and lemmas long-awned, the awns spreading, often forked ..... 57. **SITANION.**

1. IMPERATA Cyrillo

1. **Imperata hookeri** Rupr.; Anderss. Öfv. Svensk. Vet. Akad. Förh. 12: 160. 1855.

Desert areas, dry hillsides, and rocky canyons of the Covillea belt. Southern California and southern Nevada to Texas and Mexico.

2. ANDROPOGON L. Beardgrass

Racemes single on each peduncle ..... 1. **A. scoparius.**
Racemes 2 or more on each peduncle.
Racemes numerous, aggregate in a pale silky panicle ..... 5. **A. saccharoides.**
Racemes 2 to 4, digitate or nearly so, not panicled.
Pedicellate spikelets sterile or obsolete. Racemes in pairs, densely silky, partly included in pinkish spathes, these aggregate in a dense flabelliform inflorescence ..... 4. **A. glomeratus.**
Pedicellate spikelet staminate or perfect, similiar to the sessile one.
Rootstocks present; sterile pedicel and rachis joints conspicuously villous; awn usually reduced or obsolete ..... 2. **A. hallii.**
Rootstocks wanting; sterile pedicel and rachis joints short-villous; awn of sessile spikelet well developed ..... 3. **A. furcatus.**

1. **Andropogon scoparius** Michx. Fl. Bor. Amer. 1: 57. 1803.

Plains, foothills, and lower canyons of the artemisia and pinyon belts. Quebec to California, southward to Florida and Mexico.

2. **Andropogon hallii** Hack. Sitzungsb. Akad. Wiss. Math. Naturw. (Wien) 89: 127. 1884.

Plains and dry hillsides of the artemisia belt; southern Utah. North Dakota to Montana, southward to Texas, Arizona, and Mexico.

3. Andropogon furcatus Muhl.; Willd. Sp. Pl. **4**: 919. 1806.

Plains, foothills, and canyons, upward to the aspen belt. Ontario to Florida, Utah, and Arizona.

4. Andropogon glomeratus (Walt.) B. S. P. Prel. Cat. N. Y. 67. 1888.

Cinna glomerata Walt. Fl. Carol. 59. 1788.

Plains and hillsides of the Covillea belt. Florida to southern Nevada, California, and Mexico.

5. Andropogon saccharoides Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Plains and hillsides of the artemisia and Covillea belts. Western Texas to southern Nevada, Mexico, and the West Indies.

3. SORGHASTRUM Nash

1. Sorghastrum nutans (L.) Nash in Small, Fl. Southeast. U. S. 66. 1903.

Andropogon nutans L. Sp. Pl. 1045. 1753.

Plains, hillsides, and rocky canyons of the artemisia belt. Quebec to Saskatchewan, southward to Mexico.

4. HILARIA H. B. K.

Culms and leaves felty-pubescent ..... 1. H. rigida.
Culms and leaves scabrous ..... 2. H. jamesii.

1. Hilaria rigida (Thurb.) Benth.; Scribn. Bull. Torrey Club **9**: 33. 1882.

Pleuraphis rigida Thurb. in S. Wats. Bot. Calif. **2**: 293. 1880.

Desert areas, hillsides, and rocky canyons of the Covillea belt. Southern Utah to southern California, southward to Mexico.

2. Hilaria jamesii (Torr.) Benth. Journ. Linn. Soc. Bot. **19**: 62. 1881.

GALLETA GRASS.

Pleuraphis jamesii Torr. Ann. Lyc. N. Y. **1**: 148. *pl. 10*. 1824.

Desert areas, hillsides, and lower canyons. Wyoming to Nevada and southern California, southward to Texas and Mexico.

5. SYNTHERISMA Walt. CRABGRASS

1. Syntherisma sanguinalis (L.) Dulac, Fl. Haut. Pyr. 77. 1867.

Panicum sanguinale L. Sp. Pl. 57. 1753.

Waste places and cultivated ground; introduced from Europe. Throughout the United States and tropical America.

6. PASPALUM L.

1. Paspalum distichum L. Syst. Nat. ed. 10. **2**: 855. 1759.

Along irrigation ditches, Fallon, Nevada. Southern United States to Ar gentina.

7. PANICUM L.

Plants annual, the diffuse panicles becoming tumbleweeds.

Spikelets 2 to 2.3 mm. long; blades not crowded toward the base of stem. 1. P. capillare.
Spikelets 3 to 3.3 mm. long; blades usually crowded toward the base. 2. P. barbipulvinatum.

Plants perennial.

Plants producing either creeping rootstocks or stolons.

Panicle diffuse; spikelets pointed; plants with rootstocks. 3. P. virgatum.

Panicle narrow, contracted; spikelets obtuse; plants with long wiry stolons ..... 8. P. obtusum.

Plants without rootstocks or stolons. Vernal and autumnal phases dissimilar.

Spikelets 3.2 to 3.3 mm. long; culms relatively stout. 7. P. scribnerianum.

Spikelets not over 2 mm. long; culms slender.

Blades glabrous or nearly so on the upper surface, firm in texture. 5. P. tennesseense.

Blades pubescent on the upper surface.

Branching culms decumbent-spreading; blades pilose on the upper surface ..... 6. P. pacificum.

Branching culms stiffly erect or ascending; blades appressed-pubescent or pilose at the base only ..... 4. P. huachucae.

1. Panicum capillare L. Sp. Pl. 58. 1753. WITCHGRASS.

Fields and waste places. Nova Scotia to Florida, Texas, Nevada, and British Columbia.

2. Panicum barbipulvinatum Nash in Rydb. Mem. N. Y. Bot. Gard. 1: 21. 1900.

Waste places, open ground, and canyons, upward to the spruce belt. Wisconsin to British Columbia, southward to Texas and California.

3. Panicum virgatum L. Sp. Pl. 59. 1753. SWITCHGRASS.

Plains, salt meadows, moist ground, and woods. Maine to Manitoba, southward to Nevada, the West Indies, and Central America.

4. Panicum huachucae Ashe, Journ. Elisha Mitchell Soc. 15: 51. 1898.

Plains and valleys of the artemisia belt. Maine to Montana, southward to North Carolina, Utah, and California.

5. Panicum tennesseense Ashe, Journ. Elisha Mitchell Soc. 15: 52. 1898.

Open moist ground of the artemisia belt. Maine to Georgia, westward to Minnesota, Utah, and Arizona.

6. Panicum pacificum Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 229. 1910.

Artemisia, pinyon, and aspen belts. British Columbia and Idaho to Arizona and southern California.

7. Panicum scribnerianum Nash, Bull. Torrey Club 22: 421. 1895.

Sandy meadows and river valleys; Idaho. Maine to Tennessee, westward to Washington and California.

8. Panicum obtusum H. B. K. Nov. Gen. & Sp. 1: 98. 1816.

Plains and river valleys; northwestern Arizona. Kansas to Texas, Colorado, and Arizona.

8. ECHINOCHLOA Beauv.

Panicles usually pyramidal, loose, the lower branches longer, commonly spreading; spikelets mucronate or awned ..... 1. E. crusgalli.

Panicles oblong, compact, the short branches erect or nearly so; spikelets mucronate; culms not fleshy, tall, nor robust. 1a. E. crusgalli zelayensis.

1. Echinochloa crusgalli (L.) Beauv. Ess. Agrost. 53. 1812. BARNYARD GRASS.

Panicum crusgalli L. Sp. Pl. 56. 1753.

Waste places and cultivated ground, introduced. Throughout North America, except the extreme north; also in Europe and Asia.

1a. **Echinochloa crusgalli zelayensis** (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. **22**: 147. 1920.

Oplismenus zelayensis H. B. K. Nov. Gen. & Sp. 1: 108. 1816.

In waste ground, mostly alkaline, and on wooded slopes and in canyons, near settlements. Michigan to California, southward to South America.

9. CHAETOCHLOA Scribn.

Panicle cylindric, yellow; bristles 5 to 12 at base of each spikelet. **1. C. lutescens.**

Panicle tapering to summit and base, green; bristles 1 to 3 at base of each spikelet ---------- **2. C. viridis.**

1. **Chaetochloa lutescens** (Weigel) Stuntz, U. S. Dept. Agr. Bur. Pl. Ind. Bull. **31**: 86. 1914. YELLOW FOXTAIL.

Panicum lutescens Weigel, Obs. Bot. 20. 1772.

Waste places and cultivated ground; introduced from Europe. Canada, southward to Florida and California.

2. **Chaetochloa viridis** (L.) Scribn. U. S. Dept. Agric. Div. Agrost. Bull. **4**: 39. 1897. GREEN FOXTAIL.

Panicum viride L. Syst. Nat. ed. 10. **2**: 870. 1759.

Waste places and cultivated ground, hillsides, and canyons; introduced from Europe. United States and Canada.

10. CENCHRUS L. SANDBUR

1. **Cenchrus pauciflorus** Benth. Bot. Voy. Sulph. 56. 1844.

Waste places and cultivated ground; Springdale, Utah. Maine to Oregon, southward to West Indies and Mexico.

11. HOMALOCENCHRUS Mieg. RICEGRASS

1. **Homalocenchrus oryzoides** (L.) Mieg; Poll. Hist. Pl. Palat. **1**: 52. 1776.

Phalaris oryzoides L. Sp. Pl. 55. 1753.

Edges of ponds and rivers; southern Idaho and Oregon. Newfoundland to Washington, California, and Florida.

12. PHALARIS L.

Plants perennial, with rootstocks; panicle commonly 10 cm. long or more. **1. P. arundinacea.**

Plants annual; panicle 2 to 5 cm. long ---------- **2. P. caroliniana.**

1. **Phalaris arundinacea** L. Sp. Pl. 55. 1753. REED CANARY GRASS.

Wet places and along edges of ponds and streams, upward to 1,800 meters. New Brunswick to Alaska, southward to Delaware, New Mexico, and Nevada; also in Europe and Asia.

2. **Phalaris caroliniana** Walt. Fl. Carol. 74. 1788.

Wet places in valleys, along edges of ponds and rivers; Virgen River, Nevada. South Carolina to Nevada, California, and southern Oregon.

13. TORRESIA Ruiz & Pav.

1. **Torresia odorata** (L.) Hitchc. Amer. Journ. Bot. **2**: 301. 1915. VANILLA GRASS.

Holcus odoratus L. Sp. Pl. 1048. 1753.

Canyons and mountain sides, upward to the subalpine belt. Labrador to Alaska, southward to New Mexico and Arizona.

14. ARISTIDA L. THREE-AWN

Plants annual, freely branching. Panicles narrow, dense__1. **A. adscensionis.**
Plants perennial.
Panicle diffuse, the stiff branches spreading. Plant usually tall, rather stout_____2. **A. divaricata.**
Panicles narrow, the branches narrowly ascending.
Neck of fruit slender, about as long as the body; spikelets crowded, appressed. Awns not over 3 cm. long_____3. **A. glauca.**
Neck of fruit short; spikelets not crowded nor appressed.
Awns 5 to 10 cm. long; culms leafy throughout_____4. **A. longiseta.**
Awns less than 5 cm. long.
Leaves crowded at base, forming a dense cushion; pedicels stiffly erect. **5. A. fendleriana.**
Leaves scattered along the culm; pedicels usually somewhat spreading_____6. **A. purpurea.**

1. **Aristida adscensionis** L. Sp. Pl. 82. 1753.
Aristida bromoides H. B. K. Nov. Gen. & Sp. 1: 122. 1816.
Desert areas, dry hillsides, and canyons of the Covillea belt. Iowa to Texas, westward to southern Nevada (?) and California.

2. **Aristida divaricata** Humb. & Bonpl.; Willd. Enum. Pl. 99. 1809.
Plains and dry hillsides of the Covillea belt. Western Texas to southern Nevada (?) and southern California.

3. **Aristida glauca** (Nees) Walp. Ann. 1: 925. 1840.
Chaetaria glauca Nees, Linnaea 19: 688. 1843.
Desert areas and rocky hillsides of the Covillea belt. Iowa to Texas, westward to southern Utah and southern California.

4. **Aristida longiseta** Steud. Syn. Pl. Glum. 1: 420. 1854.
Plains and foothills; about Great Salt Lake. Illinois to Oregon, southward to Texas and Mexico.

5. **Aristida fendleriana** Steud. Syn. Pl. Glum. 1: 420. 1854.
Plains, mountain sides, and canyons of the Covillea and artemisia belts. North Dakota to Iowa, Texas, Arizona, and California.

6. **Aristida purpurea** Nutt. Trans. Amer. Phil. Soc. n. ser. 5: 154. 1837.
Plains and rocky slopes of the Covillea belt. Kansas to southern California, southward to Mexico.

15. STIPA L. NEEDLEGRASS

Awn plumose.
Awn 10 to 20 cm. long, very plumose above the second bend. **1. S. neomexicana.**
Awn less than 10 cm. long.
Awn with 1 bend, very plumose below the bend, about 4 cm. long. **2. S. speciosa.**
Awn with 2 bends, plumose to the second bend.
Ligule 3 to 6 mm. long. Panicle loose_____3. **S. thurberiana.**
Ligule very short.
Sheaths pubescent. Panicle narrow, rather dense, usually elongate. **4. S. elmeri.**
Sheaths glabrous (rarely pubescent in no. 5).
Blades involute, mostly basal; panicle loose____5. **S. occidentalis.**
Blades flat, tardily involute, not clustered at base; panicle narrow, elongate_____6. **S. californica.**

Awn not plumose, more or less scabrous.
Lemma conspicuously hairy, the hairs 4 mm. long. Awn about 2 cm. long, with 1 bend; culms 30 to 50 cm. high----------7. S. parishii.
Lemma pubescent, the hairs not over 2 mm. long.
Panicle open, the branches naked below, more or less spreading.
Awns flexuous, indistinctly bent; base of panicle usually enclosed in sheath----------8. S. comata.
Awns not flexuous, distinctly bent; panicle exserted.
8a. S. comata intermedia.

Panicle narrow, the branches erect.
Lemma villous, the hairs at apex erect, 2 mm. long, forming a short pappus-like crown----------9. S. scribneri.
Lemma short-pubescent, with no crown of hairs at summit.
Sheaths pubescent. Culms pubescent below the nodes.
10. S. williamsii.

Sheaths and culms glabrous.
Sheaths hairy at the throat.
Glumes thin; lemma about 5 mm. long--------11. S. viridula.
Glumes firm; lemma about 7 mm. long----------12. S. vaseyi.
Sheaths not hairy at the throat.
Awn flexuous, scarcely bent, loosely twisted below, about 5 cm. long----------13. S. arida.
Awn not flexuous, twice bent, distinctly twisted below, mostly less than 4 cm. long.
Blades slender, involute; lemma scarcely 5 mm. long.
14. S. lettermani.
Blades flat (sometimes most of them drying involute); lemma usually more than 5 mm. long.
Lemma about 7 mm. long; culms usually 1 to 1.5 meters high.
15. S. nelsoni.
Lemma 5 to 6 mm. long; culms usually not over 0.8 meter high----------16. S. minor.

1. Stipa neomexicana (Thurb.) Scribn. U. S. Dept. Agri. Div. Agrost. Bull. 17: 132, *fig. 428.* 1889.

Stipa pinnata neomexicana Thurb. in Coulter, Man. Rocky Mount. 408. 1885.

Plains, canyons, and dry hillsides of the artemisia belt. Colorado to Texas, Utah, and Arizona.

2. Stipa speciosa Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5^1: 45. 1842.

Desert areas, canyons, and mountain sides of the Covillea and artemisia belts. Colorado to central California, southward to South America.

3. Stipa thurberiana Piper, U. S. Dept. Agr. Div. Agrost. Circ. 27: 10. 1900.

Desert areas, canyons, and dry hillsides of the artemisia belt. Washington and Idaho to Nevada and California.

4. Stipa elmeri Piper & Brodie, U. S. Dept. Agr. Div. Agrost. Bull. 11: 46. 1898.

Mountain sides and canyons of the artemisia, pinyon, and yellow pine belts. Washington and Idaho to Nevada and southern California.

5. Stipa occidentalis Thurb.; S. Wats. in King, Geol. Expl. 40th. Par. 5: 380. 1871.

Canyons and mountain sides of the artemisia belt, upward to the spruce belt. Washington to Wyoming, Nevada, and California.

6. **Stipa californica** Merr. & Davy, Univ. Calif. Publ. Bot. 1: 61. 1902.

Canyons and mountain sides of the yellow pine and aspen belts. Oregon, California, and western Nevada.

7. **Stipa parishii** Vasey, Bot. Gaz. 7: 33. 1882.

Canyons and mountain sides of the pinyon, yellow pine, and aspen belts. Western Nevada and southern California.

8. **Stipa comata** Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5: 75. 1842.

NEEDLE-AND-THREAD GRASS.

Plains, canyons, and mountain sides of the artemisia belt, upward to 2,200 meters. Alberta to Alaska, southward to New Mexico and California.

8a. **Stipa comata intermedia** Scribn. Bot. Gaz. 11: 171. 1886.

Plains, canyons, and mountain sides of the artemisia, pinyon, and aspen belts. Saskatchewan to New Mexico and California.

9. **Stipa scribneri** Vasey, Bull. Torrey Club 11: 125. 1884.

Valleys, canyons, and hillsides of the Covillea belt, upward to 2,400 meters. Colorado and Texas to Arizona and Nevada.

10. **Stipa williamsii** Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 45. *pl. 4.* 1898.

Plains, canyons, and mountain sides of the artemisia belt, upward to the spruce belt. Montana to Colorado, westward to Washington and Nevada.

11. **Stipa viridula** Trin. Mém. Acad. St. Péterb. VI. Sci. Nat. 2^1: 39. 1836.

Plains and canyons of the artemisia, pinyon, and aspen belts. Saskatchewan to Kansas, westward to California.

12. **Stipa vaseyi** Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 46. 1898.

Foothills, canyons, and mountain sides of the pinyon and aspen belts. Wyoming to Texas, Arizona, California, and Mexico.

13. **Stipa arida** Jones, Proc. Calif. Acad. II. 5: 725. 1895.

Foothills and rocky canyons of the pinyon belt. Utah and Arizona.

14. **Stipa lettermani** Vasey, Bull. Torrey Club 13: 53. 1886.

Pinyon, aspen, and spruce belts. Wyoming to New Mexico, westward to Idaho and California.

15. **Stipa nelsoni** Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 46. 1898.

Aspen and spruce belts. Montana to New Mexico, westward to Washington and California

16. **Stipa minor** (Vasey) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 46. 1898.

Stipa viridula minor Vasey, Contr. U. S. Nat. Herb. 3: 50. 1892.

Aspen and spruce belts. Montana to New Mexico, westward to Washington and California.

16. ORYZOPSIS Michx.

Lemmas conspicuously pubescent with long silky hairs.

Branches of panicle and capillary pedicels divaricately spreading. Awns inconspicuous ..... 1. O. hymenoides.

Branches of panicle and capillary pedicels erect or ascending.

Awns about 6 mm. long, early deciduous; culms usually not over 30 cm. tall ..... 2. O. webberi.

Awns 12 mm. long or more, persistent until maturity; culms mostly 40 cm. tall or more ..... 3. O. bloomeri.

Lemmas glabrous or minutely appressed-pubescent.
Panicle branches spreading or reflexed; lemmas glabrous.
4. O. micrantha.
Panicle branches stiffly erect; lemmas minutely pubescent____5. O. exigua.

1. **Oryzopsis hymenoides** (Roem. & Schult.) Ricker; Piper, Contr. U. S. Nat. Herb. 11: 109. 1906.
Stipa hymenoides Roem. & Schult. Syst. Veg. 2: 339. 1817.
Desert areas, plains, canyons, and mountain sides of the Covillea belt, upward to 2,700 meters. Manitoba to Texas, westward to California and Mexico.

2. **Oryzopsis webberi** (Thurb.) Benth.; Vasey, Grasses U. S. 23. 1883.
Eriocoma webberi Thurb. in S. Wats. Bot. Calif. 2: 283. 1880.
Desert areas and foothills of the artemisia belt. Colorado to California.

3. **Oryzopsis bloomeri** (Boland.) Ricker; Piper, Contr. U. S. Nat. Herb. 11: 109. 1906.
Stipa bloomeri Boland. Proc. Calif. Acad. 4: 168. 1872.
Plains and dry hillsides of the artemisia belt; southeastern Oregon. Manitoba to Washington, southward to New Mexico and California.

4. **Oryzopsis micrantha** (Trin. & Rupr.) Thurb. Proc. Acad. Phila. 1863: 78. 1863.
Urachne micrantha Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5: 16. 1842.
Plains, foothills, and canyons of the Covillea belt, upward to 2,700 meters. Nebraska to Saskatchewan, southward to New Mexico and Arizona.

5. **Oryzopsis exigua** Thurb. in Wilkes, U. S. Expl. Exped. 17: 481. 1874.
Mountain sides and canyons of the pinyon, aspen, and spruce belts. Washington and Idaho to Utah and Nevada.

17. MUHLENBERGIA Schreb.

Plants producing creeping scaly rhizomes.
Callus hairs copious, as long as the lemma_____1. M. andina.
Callus hairs scanty, not more than half as long as the lemma.
Panicle open, the branches and long pedicels capillary.
2. M. pungens.
Panicle narrow, the branches and short pedicels not capillary.
Blades short, usually less than 2 mm. wide, often involute.
Lemma awned.
Awn about as long as the body; sheaths and blades puberulent.
3. M. curtifolia.
Awn much longer than the body; sheaths and blades glabrous, minutely nodulose _____11. M. polycaulis.
Lemma mucronate only. Sheaths and lower surface of blades glabrous.
Culms erect or decumbent at base only; ligule 1 mm. long.
4. M. squarrosa.
Culms creeping; ligule scarcely visible_____5. M. repens.
Blades relatively long, more than 3 mm. wide.
Panicle spikelike, somewhat interrupted; lemmas awnless. Glumes awn-tipped_____6. M. racemosa.
Panicle branched, the branches densely flowered; lemmas awned.
7. M. foliosa ambigua.

Plants without creeping scaly rhizomes, but the base sometimes decumbent and rooting.

Lemmas mucronate or short-awned.

Culms delicate; blades mostly less than 2 cm. long; plants forming a thin tangled sod in wet ground----------8. M. filiformis.

Culms wiry; blades mostly more than 5 cm. long; plants tufted, in dry ground----------9. M. wrightii.

Lemmas distinctly awned, the awn as long as the body of the lemma or longer.

Culms freely branching, spreading; panicle open, the branches and long pedicels capillary----------13. M. porteri.

Culms simple or nearly so, usually erect; panicle narrow, the branches and short pedicels not capillary.

Second glume 3-toothed----------10. M. montana.

Second glume entire.

Lemma villous all over; glumes nearly as long as the lemma. 11. M. polycaulis.

Lemma minutely pubescent at the very base only; glumes about half as long as the lemma----------12. M. pauciflora.

1. Muhlenbergia andina (Nutt.) Hitchc. U. S. Dept. Agr. Bull. **722**: 145. 1920.

Calamagrostis andina Nutt. Journ. Acad. Phila. II. **1**: 187. 1848.

Plains, canyons, and mountain sides of the artemisia belt, upward to 2,700 meters. Montana to New Mexico, westward to Washington and California.

2. Muhlenbergia pungens Thurb. Proc. Acad. Phila. **1863**: 78. 1863.

Plains, sandhills, and dry canyons of the artemisia and pinyon belts. Nebraska to Utah, southward to Texas and Arizona.

3. Muhlenbergia curtifolia Scribn. Bull. Torrey Club **38**: 328. 1911.

Rocky canyons of the artemisia and pinyon belts. Southern Utah.

4. Muhlenbergia squarrosa (Trin.) Rydb. Bull. Torrey Club **36**: 531. 1909.

Vilfa squarrosa Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **4**[1]: 100. 1840.

Alkaline meadows, canyons, and mountain sides of the artemisia, pinyon, and aspen belts. Maine to Alberta and Washington, southward to Mexico.

5. Muhlenbergia repens (Presl) Hitchc. in Jepson, Fl. Calif. **1**: 111. 1912.

Sporobolus repens Presl, Rel. Haenk. **1**: 241. 1830. CIENAGA GRASS.

Plains and dry hillsides of the artemisia and Covillea belts, forming dense colonies; southern Nevada. Western Texas to California, southward to Mexico.

6. Muhlenbergia racemosa (Michx.) B. S. P. Prel. Cat. N. Y. 67. 1888.

Agrostis racemosa Michx. Fl. Bor. Amer. **1**: 53. 1803.

Valleys and canyons of the artemisia belt, upward to the spruce belt. Newfoundland to New Jersey, westward to Washington, Nevada, and New Mexico.

7. Muhlenbergia foliosa ambigua (Torr.) Scribn. Rhodora **9**: 20. 1907.

Muhlenbergia ambigua Torr. in Nicoll. Rep. Miss. 164 (237). 1843.

Wooded slopes at 1,800 meters; near Humboldt Pass. Iowa to Missouri, westward to Oregon and Nevada.

8. Muhlenbergia filiformis (Thurb.) Rydb. Bull. Torrey Club **32**: 600. 1905.

Vilfa depauperata filiformis Thurb.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 376. 1871.

Mountain meadows of the aspen and spruce belts. Montana to Washington, southward to Arizona and California.

9. Muhlenbergia wrightii Vasey; Coulter, Man. Rocky Mount. 409. 1885.

Mountain sides and canyons of the pinyon, aspen, and spruce belts. Montana to New Mexico and Arizona.

10. Muhlenbergia montana (Nutt.) Hitchc. U. S. Dept. Agr. Bull. **772**: 147. 1920.

Calycodon montanum Nutt. Journ. Acad. Phila. II. 1: 186. 1848.

Muhlenbergia trifida Hack. Repert. Nov. Sp. Fedde **8**: 518. 1910.

Meadows and hillsides of the artemisia and pinyon belts. Western Texas to Utah and California, southward to Mexico.

This is *M. gracilis* of some authors, but not *M. gracilis* H. B. K.

11. Muhlenbergia polycaulis Scribn. Bull. Torrey Club **38**: 327. 1911.

Rocky canyons and dry ledges of the artemisia and pinyon belts. Texas to southeastern Utah, Arizona, and Mexico.

12. Muhlenbergia pauciflora Buckl. Proc. Acad. Phila. **1862**: 91. 1863.

Hillsides and canyons of the artemisia and pinyon belts. Texas to Colorado, Utah (?), and Mexico.

13. Muhlenbergia porteri Scribn.; Beal, Grasses N. Amer. **2**: 259. 1896.

MESQUITE GRASS.

Plains and dry hillsides of the Covillea belt. Colorado to western Texas, southwestern Utah, southern Califoria, and Mexico.

18. PHLEUM L. TIMOTHY

Inflorescence cylindric, several times longer than broad_____1. **P. pratense.**
Inflorescence oblong-elliptic, 2 to 3 times longer than broad____2. **P. alpinum.**

1. Phleum pratense L. Sp. Pl. 59. 1753.

Meadows, mountain sides, and canyons of the artemisia belt, upward to the spruce belt; introduced from Europe and extensively cultivated. Throughout Canada and United States.

2. Phleum alpinum L. Sp. Pl. 59. 1753.

Mountain meadows and slopes of the aspen and spruce belts. Canada to New Hampshire, New Mexico, California, and Alaska; also in Europe and Asia.

19. ALOPECURUS L.

Spikelets conspicuously woolly; inflorescence oblong, not more than 2 or 3 times longer than broad_____1. **A. alpinus.**
Spikelets more or less pubescent, not woolly; inflorescence linear, many times longer than broad.
  Awn attached about the middle of the lemma, not exceeding the glumes more than 1 mm_____2. **A. aequalis.**
  Awn attached near the base of the lemma, exceeding the glumes 2.5 mm. or more_____3. **A. geniculatus.**

1. Alopecurus alpinus J. E. Smith; Sowerby, Engl. Bot. *pl. 1126*. 1803.

Spruce and alpine belts; Uintah Mountains. Arctic America to Colorado and Utah.

2. Alopecurus aequalis Sobol. Fl. Petrop. 16. 1799.

Valleys and canyons along watercourses, artemisia belt and upward to 3,000 meters. Maine to Pennsylvania, California, and Alaska.

3. Alopecurus geniculatus L. Sp. Pl. 60. 1753.

Wet meadows, edges of swamps, pools, and rivers of the artemisia belt; Idaho. Newfoundland to Alaska, southward to Florida, Arizona, and Idaho; also in Europe and Asia.

20. SPOROBOLUS R. Br. DROPSEED

Plant annual, low, tufted. Pedicels capillary; spikelets minute. **1. S. confusus.**

Plants perennial.

Plant producing creeping rhizomes. Blades mostly less than 5 cm. long. **2. S. asperifolius.**

Plants tufted, not producing rhizomes.

Panicles diffuse, about as broad as long, the branches stiff; sheaths not hairy at the mouth **3. S. airoides.**

Panicles narrow or narrowly pyramidal, not diffuse with stiff branches; sheaths with a dense tuft of white hairs at the mouth.

Panicle branches flexuous **4. S. flexuosus.**

Panicle branches straight, often erect.

Panicles or exserted part more or less open, the branches naked at base (late in the season spikelike panicles borne on branches wholly or partly included in the sheaths) **5. S. cryptandrus.**

Panicles compact, spikelike, the branches spikelet-bearing from the base **6. S. contractus.**

1. Sporobolus confusus (Fourn.) Vasey, Bull. Torrey Club **15**: 293. 1888.

Vilfa confusa Fourn. Mex. Pl. **2**: 101. 1886.

Moist ground near watercourses of the artemisia, pinyon, and yellow pine belts. Washington to Texas and Mexico.

2. Sporobolus asperifolius Nees & Mey. Nov. Act. Nat. Cur. **19**: Suppl. 1: 141. 1843.

Vilfa asperifolia Nees & Mey. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4^1: 95. 1840.

Meadows and wet places in valleys, and along streams of the Covillea, artemisia, and yellow pine belts. British Columbia to North Dakota, southward to Mexico.

3. Sporobolus airoides Torr. U. S. Rep. Expl. Miss. Pacif. 7^3: 21. 1856.

ALKALI SACATON.

Agrostis airoides Torr. Ann. Lyc. N. Y. **1**: 151. 1824.

Desert areas and dry hillsides of the Covillea, artemisia, and pinyon belts. Washington to South Dakota, southward to Mexico.

4. Sporobolus flexuosus (Thurb.) Rydb. Bull. Torrey Club **32**: 601. 1905.

Vilfa cryptandra flexuosa Thurb.; Vasey in Rothr. Cat. Pl. Surv. W. 100th Merid. **6**: 282. 1878

Plains and rocky canyons; along San Juan River, at 1,200 to 1,500 meters. Nevada and Utah to Texas and Mexico.

5. Sporobolus cryptandrus (Torr) A. Gray, Man. 576. 1848.

Agrostis cryptandrus Torr. Ann. Lyc. N. Y. **1**: 151. 1824.

Desert areas, sage plains, and canyons, upward to 2,100 meters. Massachusetts to Pennsylvania, westward to Saskatchewan, Washington, Arizona, and Mexico.

6. Sporobolus contractus Hitchc. Amer. Journ. Bot. **2**: 303. 1915.

Desert areas, dry hillsides, and canyons of the Covillea and artemisia belts. Texas to Colorado, Nevada, California, and southward.

21. BLEPHARONEURON Nash

1. Blepharoneuron tricholepis (Torr.) Nash, Bull. Torrey Club **25**: 88. 1898.

Vilfa tricholepis Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 155. 1857.

Aspen and spruce belts. Colorado and Utah to Texas and Mexico.

22. EPICAMPES Presl

Inflorescence strict, dense and spikelike; ligule 1 mm. long_____1. **E. rigens.**
Inflorescence narrow but not spikelike, the branches ascending; ligule 10 mm. long, indurate_____2. **E. ligulata.**

1. **Epicampes rigens** Benth. Journ. Linn. Soc. Bot. **19**: 88. 1881. DEERGRASS.
Meadows, canyons, and dry hillsides of the Covillea, artemisia, and pinyon belts. Western Texas to California and southward.

2. **Epicampes ligulata** Scribn. Contr. U. S. Nat. Herb. **3**: 58. 1892.
Pine areas, mountain sides, and canyons, at 2,100 to 2,700 meters. Texas to Nevada and southward.

23. POLYPOGON Desf.

Plants annual; panicles soft, silky, the awns about 10 mm. long.
1. **P. monspeliensis.**
Plants perennial; panicles not soft and silky, the awns not over 3 mm. long.
2. **P. lutosus.**

1. **Polypogon monspeliensis** (L.) Desf. Fl. Atlant. **1**: 67. 1798.
Alopecurus monspeliensis L. Sp. Pl. 61. 1753.
Meadows and along ditches about settlements. New Hampshire to British Columbia, southward to Mexico; introduced from Europe.

2. **Polypogon lutosus** (Poir.) Hitchc. U. S. Dept. Agr. Bull. **772**: 138. 1920.
Agrostis lutosus Poir. in Lam. Encycl. Suppl. **1**: 249. 1810.
About Indian settlements, northern Arizona. British Columbia to California, New Mexico, and the Gulf Coast; introduced from Europe.

24. CINNA L. WOODREED

1. **Cinna latifolia** (Trevir.) Griseb. in Ledeb. Fl. Ross. **4**: 435. 1853.
Agrostis latifolia Trevir.; Göpp. Beschr. Bot. Gart. Breslau 82. 1830.
Aspen and spruce belts. Temperate North America, Europe, and Asia.

25. AGROSTIS L. BENTGRASS

Palea well developed.
Rachilla prolonged behind the palea; plants relatively delicate, producing neither stolons nor rhizomes_____1. **A. thurberiana.**
Rachilla not prolonged behind the palea; plants producing either stolons or rhizomes.
Panicles rather open; glumes scabrous on the keel only; plants producing scaly rhizomes_____2. **A. palustris.**
Panicles narrow; glumes scabrous all over; plants stoloniferous.
3. **A. verticillata.**
Palea obsolete; plants tufted, producing neither stolons nor scaly rhizomes.
Panicle narrow, densely flowered, the branches mostly spikelet-bearing from the base.
Panicle 2 to 4 cm. long; culms delicate, mostly less than 20 cm. tall.
5. **A. rossae.**
Panicles mostly over 10 cm. long; culms 30 to 100 cm. tall (dwarf plants have stout culms and dense spikelike panicles)_____4. **A. exarata.**
Panicles open, the branches naked at base.
Panicles diffuse, the capillary branches spikelet-bearing toward the ends.
Culms not over 80 cm. tall_____6. **A. hiemalis.**
Culms taller, more robust, the bases sometimes slightly decumbent and rooting at the nodes_____6a. **A. hiemalis subrepens.**

Panicles open but not diffuse, the branches mostly spikelet-bearing for about half their length.

Plants delicate, not over 40 cm. tall; spikelets 1.5 to 2 mm. long. **7. A. idahoensis.**

Plants stouter, over 50 cm. tall; spikelets 2.5 to 3 mm. long. **8. A. oregonensis.**

1. Agrostis thurberiana Hitchc. U. S. Dept. Agr. Bur. Pl. Ind. Bull. **68**: 23. 1905.

Bogs and moist ground in the aspen and spruce belts. British Columbia to Montana, Colorado, and California.

2. Agrostis palustris Huds. Fl. Angl. 27. 1762. REDTOP.

Meadows, canyons, and mountain sides, at 1,000 to 3,000 meters; introduced. This is the species hitherto commonly called *A. alba*. Newfoundland to British Columbia, southward to Mexico; also in Europe and Asia.

3. Agrostis verticillata Vill. Prosp. Pl. Dauph. 16. 1779.

Moist ground, along irrigating ditches, and in canyons, at 1,200 to 1,800 meters; introduced from Europe. California to Utah, Texas, and Mexico.

4. Agrostis exarata Trin. Gram. Unifl. 207. 1824.

Meadows, along ditches, in canyons, and on mountain sides of the artemisia belt, upward to the spruce belt. Alaska to Mexico.

5. Agrostis rossae Vasey, Contr. U. S. Nat. Herb. **3**: 76. 1892.

Aspen, spruce, and alpine belts. British Columbia to Colorado and California.

6. Agrostis hiemalis (Walt.) B. S. P. Prel. Cat. N. Y. 68. 1888.

Cornucopiae hiemalis Walt. Fl. Carol. 73. 1788.

Aspen and spruce belts. North America.

6a. Agrostis hiemalis subrepens Hitchc. U. S. Dept. Agr. Bur. Pl. Ind. Bull. **68**: 44. 1905.

Ruby Valley, Nevada, at 1,800 meters. Nevada to New Mexico and Mexico.

7. Agrostis idahoensis Nash, Bull. Torrey Club **24**: 42. 1897.

Mountain meadows and canyons of the aspen and spruce belts. Montana to New Mexico, westward to Washington and California.

8. Agrostis oregonensis Vasey, Bull. Torrey Club **13**: 55. 1886.

Wet meadows and springy places of the artemisia, pinyon, and yellow pine belts. Washington to Montana and Nevada.

26. CALAMAGROSTIS Adans. REEDGRASS

Awn exceeding the glumes ..... **1. C. purpurascens.**

Awn included or scarcely exceeding the glumes.

Panicles loosely flowered, open. Callus hairs as long as the lemma; awn indistinct ..... **7. C. canadensis.**

Panicles densely flowered, strict, narrow, often spikelike.

Awn bent, protruding from the side of the glumes; callus hairs sparse, short; panicles spikelike.

Blades narrow, soon involute; sheaths glabrous on the collar. **2. C. montanensis.**

Blades flat or drying involute at tip only; sheaths pubescent on the collar ..... **3. C. rubescens.**

Awn straight, included; callus hairs not much shorter than the lemma; panicles scarcely spikelike.

Blades firm, harshly scabrous, rather rigid, becoming involute.
6. C. inexpansa.

Blades relatively lax, scaberulous or smooth.
Blades involute; glumes scabrous——5. C. neglecta.
Blades flat; glumes smooth——4. C. scopulorum.

1. Calamagrostis purpurascens R. Br. in Richards. Bot. App. Frankl. Journ. 731. 1823.

Spruce and alpine belts. Alaska to Greenland, South Dakota, Colorado, and California.

2. Calamagrostis montanensis Scribn. Contr. U. S. Nat. Herb. **3**: 82. 1892.

Plains and dry hillsides; shores of Great Salt Lake. Saskatchewan and Alberta to South Dakota, Utah, and Idaho.

3. Calamagrostis rubescens Buckl. Proc. Acad. Phila. **1862**: 92. 1863.

Plains and sparsely wooded slopes, at 2,100 meters. Alberta and British Columbia, southward to Nevada and California.

4. Calamagrostis scopulorum Jones, Proc. Calif. Acad. II. **5**: 722. 1895.

Canyons and slopes of the artemisia, pinyon, and yellow pine belts. Utah and Colorado.

5. Calamagrostis neglecta (Ehrh.) Gaertn. Mey. & Scherb. Fl. Wett. **1**: 94. 1799.

Arundo neglecta Ehrh. Beitr. Naturk. **6**: 137. 1791.

Along ditches; Ephraim, Utah. Greenland to Alaska, southward to Maine, Colorado, and Oregon; also in Europe.

6. Calamagrostis inexpansa A. Gray; Torr. Fl. N. Y. **2**: 445. *pl. 152*. 1843.

Plains in wet places and in canyons along streams of the artemisia belt, upward to the spruce belt. New York and New Jersey, westward to British Columbia and California.

7. Calamagrostis canadensis (Michx.) Beauv. Ess. Agrost. 15, 157. 1812.
BLUEJOINT.

Arundo canadensis Michx. Fl. Bor. Amer. **1**: 73. 1803.

Mountain meadows and canyons of the aspen and spruce belts. Newfoundland to New Jersey, New Mexico, California, and Alaska.

27. NOTHOLCUS Nash

1. Notholcus lanatus (L.) Nash; Hitchc. in Jepson, Fl. Calif. **3**: 126. 1912.
VELVET GRASS.

Holcus lanatus L. Sp. Pl. 1048. 1753.

Introduced from Europe. Naturalized in the eastern States, California, and western Nevada (Reno and Franktown).

28. AIRA L. HAIRGRASS

Plants annual; spikelets about 8 mm. long——1. A. danthonioides.
Plants perennial; spikelets not over 5 mm. long.
Panicle elongate, narrow, loose; blades filiform, lax——2. A. elongata.
Panicle more than half as broad as long, open; blades firm, narrow, not filiform——3. A. caespitosa.

1. Aira danthonioides Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. **1**: 57. 1830.

Deschampsia danthonioides Munro in Benth. Pl. Hartw. 342. 1857.

Meadows and canyons of the artemisia, pinyon, and aspen belts. Alaska to California, Utah, and Mexico.

2. Aira elongata Hook. Fl. Bor. Amer. 2: 243. 1840.

Meadows, canyons, and mountain sides of the artemisia belt, upward to 2,700 meters. Alaska to Montana, California, and Arizona.

3. Aira caespitosa L. Sp. Pl. 64. 1753.

Wet places in the aspen and spruce belts. Newfoundland to Alaska, southward to New Jersey and California.

29. TRISETUM Pers.

Awn short, included in the glumes. Panicle somewhat spikelike---1. T. wolfii.
Awn exceeding the glumes, bent.
  Panicle dense, spikelike, strict----2. T. spicatum.
  Panicle narrow but loose, not strict.
    Glumes 3 to 4 mm. long; blades usually not over 3 mm. wide.
      3. T. montanum.
    Glumes 6 to 7 mm. long; blades commonly 5 to 10 mm. wide.
      4. T. canescens.

1. Trisetum wolfii Vasey, U. S. Dept. Agr. Month. Rep. Mar. 156. 1874.

Mountain meadows and canyons of the aspen and spruce belts; Uintah Mountains. Saskatchewan to Washington, southward to Utah and California.

2. Trisetum spicatum (L.) Richt. Pl. Eur. 1: 59. 1890.

Aira spicata L. Sp. Pl. 64. 1753.

Spruce and alpine belts. Arctic America to New Hampshire, New Mexico, and California.

3. Trisetum montanum Vasey, Bull. Torrey Club 13: 118. 1886.

Aspen and spruce belts; southeastern Utah. Wyoming and Utah to New Mexico.

4. Trisetum canescens Buckl. Proc. Acad. Phila. 1862: 100. 1863.

Hillsides and open woods. Alberta and British Columbia, southward to Colorado, Nevada, and California.

30. SPHENOPHOLIS Scribn.

Second glume obovate; panicle dense, erect.
  Panicle compact, not interrupted----1. S. obtusata.
  Panicle lobed or interrupted----1a. S. obtusata lobata.
Second glume oblanceolate; panicle lax, usually nodding----2. S. pallens.

1. Sphenopholis obtusata (Michx.) Scribn. Rhodora 8: 144. 1906.

Aira obtusata Michx. Fl. Bor. Amer. 1: 62. 1806.

Eatonia obtusata A. Gray, Man. ed. 2. 558. 1856.

On prairies and plains. Atlantic States to the Rocky Mountains; rare in northern Nevada.

1a. Sphenopholis obtusata lobata (Trin.) Scribn. Rhodora 8: 144. 1906.

Trisetum lobatum Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 66. 1830.

Plains, meadows, and open woods, at 1,500 to 1,800 meters; much commoner than the species in the Great Basin. Montana to New Mexico, westward to Washington and California.

2. Sphenopholis pallens (Spreng.) Scribn. Rhodora 8: 145. 1906.

Aira pallens Spreng. Mant. Fl. Hal. 36. 1807.

Plains and hillsides; Ogden, Utah. New Brunswick to Florida, Arizona, and British Columbia.

31. KOELERIA Pers. JUNEGRASS

1. **Koeleria cristata** (L.) Pers. Syn. Pl. 1: 97. 1805.
Aira cristata L. Sp. Pl. 63. 1753.
Plains, mountain sides, and canyons, upward to 3,300 meters. Illinois to Texas, westward to British Columbia and California.

32. AVENA L. OATS

1. **Avena fatua** L. Sp. Pl. 80. 1753. WILD OATS.
In fields and along roads throughout the United States. Introduced from the Old World.
Avena sativa L., the cultivated oat, is distinguished by its nearly smooth lemmas, awless or with a small weak awn.

33. ARRHENATHERUM Beauv. OATGRASS

1. **Arrhenatherum elatius** (L.) Beauv.; Mert. & Koch, Deutschl. Fl. 1: 546. 1823.
Avena elatior L. Sp. Pl. 79. 1753.
Introduced from Europe; recorded from regions adjacent to the Great Basin. Maine to Georgia, California, and Washington.

34. DANTHONIA DC.

Panicle narrow, the spikelets appressed to the main axis.
Teeth of lemma abruptly acuminate, not aristate——1. D. cusickii.
Teeth of lemma aristate——2. D. intermedia.
Panicle open, the few branches spreading or reflexed——3. D. californica.

1. **Danthonia cusickii** (Williams) Hitchc. Amer. Journ. Bot. 2: 305. 1915.
Danthonia intermedia cusickii Williams, U. S. Dept. Agr. Div. Agrost. Circ. 30: 7. 1901.
Mountain meadows of the aspen and spruce belts. Montana to Utah and Oregon.

2. **Danthonia intermedia** Vasey, Bull. Torrey Club 10: 52. 1883.
Spruce and alpine belts. Quebec to British Columbia, southward to New Mexico and California.

3. **Danthonia californica** Boland. Proc. Calif. Acad. 2: 182. 1863.
Canyons and mountain meadows of the yellow pine, aspen, and spruce belts. British Columbia to Colorado and California.

35. CAPRIOLA Adans.

1. **Capriola dactylon** (L.) Kuntze, Rev. Gen. Pl. 1: 764. 1891. BERMUDA GRASS.
Panicum dactylon L. Sp. Pl. 58. 1753.
Along irrigation ditches; Las Vegas, Nevada. Throughout the middle and southern United States, except in the mountains; introduced from Europe.

36. SPARTINA Schreb.

1. **Spartina gracilis** Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4[1]: 110. 1840.
Alkaline meadows, at 1,200 to 1,800 meters. Saskatchewan to British Columbia, southward to Kansas and California.

37. BOUTELOUA Lag. GRAMA

Plants annual. Culms spreading or prostrate; spikelets pectinate; rachis persistent after the fall of the florets.
  Spike solitary---1. B. procumbens.
  Spikes 2 or more---2. B. barbata.
Plants perennial.
  Culms white-lanate, extensively creeping, forming large knots at the nodes.
    6. B. eriopoda.
  Culms not lanate nor creeping.
    Spikes numerous, pendulous, falling entire from the axis.
      7. B. curtipendula.
    Spikes 1 to several, erect or arcuate, the rachis persistent after the fall of the florets.
      Spikes several---5. B. rothrockii.
      Spikes 1 or 2, rarely 3.
        Rachis prolonged beyond the spikelets in a naked point; glumes black-tuberculate---3. B. hirsuta.
        Rachis not prolonged beyond the spikelets; glumes not tuberculate or rarely slightly so---4. B. gracilis.

1. **Bouteloua procumbens** (Durand) Griffiths, Contr. U. S. Nat. Herb. **14**: 364. 1912.

   Chloris procumbens Durand, Chlor. Sp. 16. 1808.

   Plains and canyons; Panguitch, Utah, at 2,100 meters. Colorado and Utah to Texas and Mexico.

2. **Bouteloua barbata** Lag. Var. Cienc. **2**[4]: 141. 1805.

   Valleys and canyons, upward to 2,100 meters. Southern Utah to California and Mexico.

3. **Bouteloua hirsuta** Lag. Var. Cienc. **2**[4]: 141. 1805.

   On plains; Nevada (*Wheeler*). Wisconsin to Missouri, southwestward to Mexico.

4. **Bouteloua gracilis** (H. B. K.) Lag.; Steud. Nom. Bot. ed. 2. **1**: 219. 1840. BLUE GRAMA.

   Chondrosium gracile H. B. K. Nov. Gen. & Sp. **1**: 176. *pl. 58*. 1816.

   Plains, canyons, and foothills, upward to 2,500 meters. Manitoba to Missouri, southwestward to California and Mexico.

5. **Bouteloua rothrockii** Vasey, Contr. U. S. Nat. Herb. **1**: 268. 1893.

   Plains and valleys; Moab, Utah. Utah to California and Mexico.

6. **Bouteloua eriopoda** Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 155. 1857. BLACK GRAMA.

   Plains, hillsides, and canyons; San Juan River, at 1,200 to 1,500 meters. Southern Utah to Texas and Mexico.

7. **Bouteloua curtipendula** (Michx.) Torr. in Emory, Mil. Reconn. 154. 1848. SIDE-OATS GRAMA.

   Chloris curtipendula Michx. Fl. Bor. Amer. **1**: 59. 1803.

   Plains and canyons, upward to 1,800 meters. Ontario to New Jersey, westward to Saskatchewan, California, and Mexico.

38. BECKMANNIA Host. SLOUGH-GRASS

1. **Beckmannia erucaeformis** (L.) Host, Icon. Gram. Austr. **3**: 5. 1805.

   Phalaris erucaeformis L. Sp. Pl. 55. 1753.

Wet places on plains and in canyons, upward to 3,000 meters. Ontario to Alaska, southward to Iowa, New Mexico, and California; also in Europe and Asia.

39. LEPTOCHLOA Beauv.

Sheaths glabrous; spikelets 7 to 12 mm. long_____1. L. fascicularis.
Sheaths papillose-pilose; spikelets about 3 mm. long_____2. L. filiformis.

1. **Leptochloa fascicularis** (Lam.) A. Gray, Man. 588. 1848.
Festuca fascicularis Lam. Tabl. Encycl. 1: 189. 1791.
Moist places on alkaline plains. Maryland to Florida, westward to California and Mexico.

2. **Leptochloa filiformis** (Lam.) Beauv. Ess. Agrost. 71, 166. 1812.
Festuca filiformis Lam. Tabl. Encycl. 1: 191. 1791.
Moist ground; Coconino National Forest, Arizona. Massachusetts to Florida, southern California, and South America.

40. MUNROA Torr.

1. **Munroa squarrosa** (Nutt.) Torr. U. S. Rep. Expl. Miss. Pacif. 4: 158. 1857.
Crypsis squarrosa Nutt. Gen. Pl. 1: 49. 1818.
Desert areas and canyons, at 1,200 to 1,500 meters; eastern Utah. Saskatchewan and Alberta, southward to Texas and Arizona.

41. PHRAGMITES Trin. Reed

1. **Phragmites communis** Trin. Fund. Agrost. 134. 1820.
Swamps, edges of rivers and lakes, upward to 2,400 meters. Temperate regions of the world.

42. TRIODIA R. Br.

Plants 15 to 30 cm. tall; culms simple, erect_____1. T. mutica.
Plants low; branches fascicled, the culms finally spreading and rooting at the fascicles_____2. T. pulchella.

1. **Triodia mutica** (Torr.) Scribn. Bull. Torrey Club 10: 30. 1883.
Tricuspis mutica Torr. U. S. Rep. Expl. Miss. Pacif. 4: 156. 1857.
Plains and hillsides of the Covillea belt; St. George, Utah; St. Thomas, Nevada. California to Colorado and Texas.

2. **Triodia pulchella** H. B. K. Nov. Gen. & Sp. 1: 155. *pl. 47*. 1816.
Desert areas and rocky hillsides of the Covillea and artemisia belts. Utah and Nevada to southern California, Texas, and Mexico.

43. ERAGROSTIS Beauv.

Plants forming low mats, the culms prostrate, rooting at the nodes; spikelets unisexual_____1. E. hypnoides.
Plants not mat-forming, the culms not rooting at the nodes; spikelets perfect.
Lemmas glandular on the keel; spikelets 3 mm. wide; plants strong-scented when fresh_____2. E. cilianensis.
Lemmas not glandular; spikelets not over 1.5 mm. wide; plants not strong-scented.
Panicle pilose in the lower axils_____3. E. caroliniana.
Panicle glabrous in the axils.
Panicles narrow; pedicels and branchlets not flexuous; spikelets 1.5 mm. wide_____4. E. lutescens.
Panicles open; pedicels and branchlets flexuous; spikelets about 1 mm. wide_____5. E. orcuttiana.

1. Eragrostis hypnoides (Lam.) B. S. P. Prel. Cat. N. Y. 69. 1888.
Poa hypnoides Lam. Tabl. Encycl. 1: 185. 1791.
Copses and sandy stream banks. New England to Washington, southward to Florida, California, and South America.

2. Eragrostis cilianensis (All.) Link; Vign. Lut. Malphighia **18**: 386. 1904.
Poa cilianensis All. Fl. Pedem. **2**: 246. 1785.
In waste places, meadows, and roadsides about settlements; introduced from Europe. Throughout the warmer parts of the world.

3. Eragrostis caroliniana (Spreng.) Scribn. Mem. Torrey Club. **5**: 49. 1894.
Poa caroliniana Spreng. Mant. Fl. Hal. 33. 1807.
Meadows, waste places, and grassy roadsides. Ontario to Florida, westward to Oregon and California.

4. Eragrostis lutescens Scribn. U. S. Dept. Agr. Div. Agrost. Circ. **9**: 7. 1899.
Sandy river banks. Washington and Idaho to Nevada.

5. Eragrostis orcuttiana Vasey, Contr. U. S. Nat. Herb. **1**: 269. 1893.
Fields and waste places of the Covillea belt. California, Nevada, and Arizona.

44. CATABROSA Beauv.

1. Catabrosa aquatica (L.) Beauv. Ess. Agrost. 157. 1812. BROOKGRASS.
Aira aquatica L. Sp. Pl. 64. 1753.
In ponds and wet mountain meadows in the aspen and spruce belts. Labrador to Alaska, southward to Nebraska, Colorado, and Utah; also in Europe and Asia.

45. MELICA L. MELIC-GRASS

Culms not bulbous at base or only slightly enlarged.
  Spikelets erect ..... 4. M. bulbosa.
  Spikelets pendulous ..... 5. M. stricta.
Culms bulbous at base.
  Pedicels capillary, flexuous or recurved ..... 1. M. spectabilis.
  Pedicels stouter, appressed.
    Panicle open; branches spreading ..... 3. M. fugax.
    Panicle narrow; branches erect.
      Sheaths and blades glabrous or scabrous ..... 2. M. bella.
      Sheaths and blades softly pubescent ..... 2a. M. bella intonsa.

1. Melica spectabilis Scribn. Proc. Acad. Phila. **1885**: 45. 1885.
Plains, foothills, and canyons, upward to 3,000 meters. Montana to British Columbia, Colorado, and Oregon.

2. Melica bella Piper, U. S. Dept. Agr. Div. Agrost. Circ. **27**: 10. 1900.
Pinyon, aspen, and spruce belts. Alberta to Colorado, westward to Oregon and Washington.

2a. Melica bella intonsa Piper, Contr. U. S. Nat. Herb. **11**: 128. 1906.
Dry hillsides. Washington to Nevada and California.

3. Melica fugax Boland. Proc. Calif. Acad. **4**: 104. 1870.
Dry hills and mountain sides. Northern California and Nevada to Washington.

4. Melica bulbosa Geyer; Thurb. in S. Wats. Bot. Calif. **2**: 304. 1880.
Foothills and canyons, upward to 2,500 meters. California, Oregon, Nevada and Idaho.

5. Melica stricta Boland. Proc. Calif. Acad. **3**: 4. 1863.

Foothills, canyons, and mountain sides, upward to 2,400 meters. California and Oregon, eastward to Utah.

46. DISTICHLIS Raf. Saltgrass

1. Distichlis spicata (L.) Greene, Bull. Calif. Acad. **2**: 415. 1887.

Uniola spicata L. Sp. Pl. 71. 1753.

Salt marshes and alkaline meadows. United States and Mexico.

47. DACTYLIS L. Orchard grass

1. Dactylis glomerata L. Sp. Pl. 71. 1753.

Fields, canyons, and mountain sides, upward to 3,000 meters; introduced. North America and Europe.

48. POA L. Bluegrass

Plants annual.

Panicle pyramidal, the branches spreading; sheaths smooth—**1. P. annua.**

Panicle narrow, contracted; sheaths scabrous—**2. P. bigelovii.**

Plants perennial.

Creeping rootstocks present.

Culms conspicuously flattened—**3. P. compressa.**

Culms terete or slightly flattened.

Lower panicle branches finally reflexed; lemmas glabrous or with very scant cobweb—**4. P. curta.**

Lower panicle branches not reflexed.

Lemmas smooth or scaberulous, but not pubescent or villous except sometimes minutely so on the lower part of the keel and marginal nerves. Lower sheaths purplish, minutely hispiduous.

6. P. wheeleri.

Lemmas pubescent on nerves or back, often cobwebby at base.

Lemmas crisp-puberulent on the lower part of the back, not cobwebby at base—**7. P. sheldoni.**

Lemmas pubescent on the nerves, cobwebby at base—**5. P. pratensis.**

Creeping rootstocks wanting.

Lemmas pubescent on the nerves or cobwebby at base.

Florets cobwebby at base.

Sheaths compressed, strongly retrorse-scabrous; plants tall, mostly over 40 cm.

Lower panicle branches usually as many as 4—**8. P. occidentalis.**

Lower panicle branches mostly in 1's or 2's, capillary. Plants delicate, mostly less than 40 cm. tall.

Branches of panicle drooping but not deflexed at base; culms solitary or few in a loose cluster, the basal leaves inconspicuous; blades mostly less than 2 mm. wide—**9. P. leptocoma.**

Branches of panicle, especially the lower, finally deflexed; culms tufted, usually leafy at base; blades as much as 4 mm. wide—**10. P. reflexa.**

Sheaths smooth or slightly scabrous.

Panicle large and spreading; culms decumbent at base, smooth, the lower sheaths compressed and usually purplish; plant usually more than 40 cm. tall—**11. P. palustris.**

Panicle small, rather narrow; culms erect, usually scabrous below panicle, the lower sheaths scarcely compressed, pale or green; plant usually less than 40 cm. tall—**12. P. crocata.**

Florets not cobwebby at base.
Blades folded, firm, scabrous, mostly erect. Panicles compact or spikelike after flowering.
Ligule 3 to 10 mm. long---13. P. longiligula.
Ligule mostly less than 1 mm. long---14. P. fendleriana.
Blades flat, or sometimes folded, soft or lax, smooth on the surface, sometimes scabrous on the margins.
Panicles ovoid, spreading. Lemmas more than 1 mm. from keel to margin---15. P. alpina.
Panicles narrow, the branches appressed after flowering.
Culms rather lax, not much longer than the numerous basal blades; glumes about 5 mm. long---16. P. pattersoni.
Culms stiff and wirey, the blades short and scattered, not in a conspicuous tuft at base; glumes 2 to 3 mm. long.
17. P. rupicola.
Lemmas not cobwebby at base nor pubescent on the keel or nerves, sometimes pubescent all over the back below. Panicles mostly narrow and compact after flowering.
Lemmas crisp-puberulent on the lower part of back; blades in a short basal tuft, the rather delicate culms slender and nearly naked.
18. P. sandbergii.
Lemmas glabrous or scabrous, sometimes slightly pubescent on nerves at base; blades not short and crowded at base.
Panicle ovoid, dense, less than 10 cm. long, long-peduncled.
19. P. epilis.
Panicle narrow, mostly over 10 cm. long, the branches appressed except at anthesis. Plants robust, usually over 50 cm. tall.
Sheaths scabrous; ligule long. Blades mostly flat.
20. P. nevadensis.
Sheaths smooth; ligule short.
Blades firm and stiff, involute---21. P. brachyglossa.
Blades lax, mostly flat.
Panicle narrow---22. P. confusa.
Panicle ample---23. P. ampla.

1. Poa annua L. Sp. Pl. 68. 1753.

Waste places and along roads about settlements; introduced from Europe. Labrador to Alaska, southward to Mexico.

2. Poa bigelovii Vasey & Scribn. Contr. U. S. Nat. Herb. 1: 270. 1893.

Plains, canyons, and mountain sides of the Covillea, artemisia, pinyon, and yellow pine belts. Colorado to California, southward to Texas and Mexico.

3. Poa compressa L. Sp. Pl. 69. 1753. CANADA BLUEGRASS.

Waste places, meadows, and canyons, upward to 2,100 meters; Bear River Canyon, Wyoming. New Hampshire to North Carolina, westward to British Columbia and California; also in Europe and Asia.

4. Poa curta Rydb. Bull. Torrey Club 36: 534. 1909.

Aspen and spruce belts. Wyoming, Idaho, and Utah.

5. Poa pratensis L. Sp. Pl. 67. 1753. KENTUCKY BLUEGRASS.

Aspen and spruce belts. North America, Europe, and Asia.

6. Poa wheeleri Vasey in Rothr. Cat. Pl. U. S. Geogr. & Geol. Surv. W. 100th Merid. 55. 1874.

Aspen, spruce, and subalpine belts. Alberta and British Columbia, southward to Colorado and Nevada.

7. Poa sheldoni Vasey, Contr. U. S. Nat. Herb. 1: 276. 1893.
Spruce and alpine belts. Montana to Colorado and Utah.

8. Poa occidentalis Vasey, Contr. U. S. Nat. Herb. 1: 274. 1893.
Aspen and spruce belts. Alaska to California, Idaho, Utah, and New Mexico.

9. Poa leptocoma Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 374. 1830.
Spruce and alpine belts. Alaska to Colorado and Nevada.

10. Poa reflexa Vasey & Scribn. Contr. U. S. Nat. Herb. 1: 276. 1893.
Poa pudica Rydb. Bull. Torrey Club 32: 603. 1905.
Poa leptocoma reflexa Jones, Contr. West. Bot. 14: 15. 1912.
Wet mountain meadows of the spruce and alpine belts. Alberta and British Columbia, southward to New Mexico and Oregon.

11. Poa palustris L. Syst. Nat. ed. 10. 874. 1759.
Aspen and spruce belts. Newfoundland to New Jersey, California, and British Columbia; also Europe and Asia.

12. Poa crocata Michx. Fl. Bor. Amer. 1: 68. 1803.
Yellow pine, aspen, spruce, and subalpine belts. Newfoundland to Alaska, southward to New England, New Mexico, and Utah.

13. Poa longiligula Scribn. & Williams, U. S. Dept. Agr. Div. Agrost. Circ. 9: 3. 1899.
Foothills, canyons, and mountain sides, upward to 3,300 meters. Oregon and California to South Dakota and New Mexico.

14. Poa fendleriana (Steud.) Vasey, U. S. Dept. Agr. Div. Bot. Bull. 13[2]: *pl. 74.* 1893.
Eragrostis fendleriana Steud. Syn. Pl. Glum. 1: 278. 1855.
Pinyon belt, upward to 3,000 meters. Washington to Wyoming, New Mexico, and northern Lower California.

15. Poa alpina L. Sp. Pl. 67. 1753.
Spruce and alpine belts. Greenland to Alaska, southward to Colorado, Utah, and Oregon.

16. Poa pattersoni Vasey, Contr. U. S. Nat. Herb. 1: 275. 1893.
Spruce and alpine belts. Wyoming, Colorado, and Utah.

17. Poa rupicola Nash, Mem. N. Y. Bot. Gard. 1: 49. 1900.
Spruce and alpine belts. Rocky Mountains of Canada to Arizona, Great Basin, and Sierra Nevada.

18. Poa sandbergii Vasey, Contr. U. S. Nat. Herb. 1: 276. 1893.
Yellow pine, aspen, and spruce belts. British Columbia to Wyoming and southern California.

19. Poa epilis Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 9: 5. 1899.
Spruce and alpine belts. Rocky Mountains of British Columbia to Colorado, west through Great Basin to eastern Washington and California.

20. Poa nevadensis Vasey, Bull. Torrey Club 10: 66. 1883.
Yellow pine, aspen, and spruce belts. Western slope of Rocky Mountains, Great Basin, and eastern Washington, Oregon, and California.

21. Poa brachyglossa Piper, Proc. Biol. Soc. Washington 18: 145. 1905.
Artemisia, pinyon, and yellow pine belts. British Columbia to Utah and California.

22. Poa confusa Rydb. Bull. Torrey Club 32: 607. 1905.

Plains and hillsides, upward to the spruce belt. North Dakota to Colorado and Nevada.

23. Poa ampla Merr. Rhodora 4: 145. 1902.

Yellow pine and aspen belts. Rocky Mountains of British Columbia to Colorado, west to eastern Washington and Oregon.

49. PANICULARIA Fabr. MANNAGRASS

Spikelets linear, usually 1 cm. long or more; panicles erect----1. P. borealis.
Spikelets oblong or elliptic, usually not over 5 mm. long; panicles nodding or drooping.
Lemmas with 5 prominent nerves----2. P. pauciflora.
Lemmas with 7 prominent nerves.
Glumes short, rounded, the lower about 1 mm. long.
Blades 1 to 3 mm. wide; culms usually less than 1 meter tall, firm, not succulent----3. P. nervata.
Blades mostly 6 to 10 mm. wide; culms usually over 1 meter tall. 4. P. elata.
Glumes oblong, whitish, the lower about 2 mm. long----5. P. grandis.

1. Panicularia borealis Nash, Bull. Torrey Club 24: 348. 1897.

Aspen and spruce belts. Maine to Alaska, southward to New York, New Mexico, and California.

2. Panicularia pauciflora (Presl) Kuntze, Rev. Gen. Pl. **1: 783. 1891.**
Glyceria pauciflora **Presl, Rel. Haenk. 1: 257. 1830.**

Wet places in mountain meadows and along streams, yellow pine belt and upward to 3,300 meters. British Columbia to Colorado and California.

3. Panicularia nervata (Willd.) Kuntze, Rev. Gen. Pl. **1: 783. 1891.**
Poa nervata **Willd. Sp. Pl. 1: 389. 1797.**
Glyceria nervata **Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 365. 1830.**

Bogs, wet meadows, and along streams in the aspen and spruce belts. Newfoundland to British Columbia, southward to Florida and Mexico.

4. Panicularia elata Nash in Rydb. Mem. N. Y. Bot. Gard. 1: 54. 1900.

Wet meadows and canyons of the aspen and spruce belts. British Columbia to New Mexico and California.

5. Panicularia grandis (S. Wats.) **Nash in Britt. & Brown, Illustr. Fl. ed. 2. 1: 265. 1913.**
Glyceria grandis **S. Wats. in A. Gray, Man. ed. 6. 667. 1890.**

Wet meadows and along streams, at 1,200 to 2,700 meters. Nova Scotia to Alaska, southward to Tennessee, New Mexico, and Nevada.

50. PUCCINELLIA Parl.

Leaves scattered; panicle usually more than 10 cm. long; lemmas minutely pubescent toward the base----1. P. nuttalliana.
Leaves mostly clustered at base; panicle usually less than 10 cm. long; lemmas glabrous----2. P. lemmoni.

1. Puccinellia nuttalliana (Schult.) Hitchc. in Jepson, Fl. Calif. **3: 163. 1912.**
Poa nuttalliana **Schult. Mant. 2: 303. 1824.**

Alkaline soil on plains, upward to 3,000 meters. North Dakota to Texas and California.

2. Puccinellia lemmoni (Vasey) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 276. *f.* 572. 1899.

Poa lemmoni Vasey, Bot. Gaz. 3: 13. 1878.

Alkaline meadows of the artemisia, pinyon, and yellow pine belts. Saskatchewan to Nevada and California.

51. FESTUCA L. Fescue

Plants annual.

Spikelets densely 5 to 13-flowered.

Lemmas smooth or scabrous——1. F. octoflora.

Lemmas hispidulous. Plants usually lower than no. 1; desert form.

1a. F. octoflora hirtella.

Spikelets loosely 1 to 5-flowered.

Panicle elongate, narrow, the branches appressed; lemmas long-awned.

5. F. megalura.

Panicle not elongate, the main branches usually divergent or reflexed.

Lemmas woolly-pubescent——2. F. arida.

Lemmas glabrous.

Pedicels appressed, panicle branches only divergent or reflexed; spikelets mostly 3 to 5-flowered——3. F. pacifica.

Pedicels as well as panicle branches divergent or reflexed; spikelets mostly 1 or 2-flowered——4. F. reflexa.

Plants perennial.

Plants producing rhizomes (these sometimes wanting). Panicle narrow; spikelets awnless——6. F. confinis.

Plants not producing rhizomes.

Blades flat, mostly rather soft and lax. Plants not densely tufted.

Lemmas awnless; panicle narrow, the branches erect or ascending.

Culms relatively slender; blades rather soft, nerves prominent on upper suface only——7. F. elatior.

Culms relatively robust; blades firm, nerves prominent on both surfaces——7a. F. elatior arundinacea.

Lemmas awned; panicle lax, the branches more or less spreading.

Awns not over 2 mm. long; culms smooth——8. F. sororia.

Awns as long as the body of the lemma or longer; culms scaberulous.

9. F. subulata.

Blades more or less involute, usually rather firm.

Ligule 2 to 4 mm. long. Lemmas awnless, sometimes cuspidate; plants rather robust——10. F. thurberi.

Ligule short.

Basal sheaths red and fibrillose; culms curved at base, forming a loose tuft, the shoots extravaginal——11. F. rubra.

Basal sheaths not red nor fibrillose; culms erect, usually forming dense tufts, the shoots intravaginal.

Lemmas awnless or nearly so.

Blades smooth, loosely involute, or folded, rather soft.

12. F. viridula.

Blades very scabrous, filiform, stiff——15. F. arizonica.

Lemmas awned.

Blades smooth. Alpine plants, often dwarf; spikelets mostly 3 or 4-flowered; lower lemma 3 to 5 mm. long.

13. F. brachyphylla.

Blades scabrous. Basal leaves numerous.
Lower lemmas 6 mm. long or more (mostly 7 mm.); spikelets mostly 4 to 8-flowered; blades usually elongate.
Panicles open, the branches more or less spreading; florets slightly spreading; awns usually more than half as long as the body of the lemma; blades often flexuous.
14. F. idahoensis.
Panicles narrow, the branches erect or narrowly ascending; spikelets more contracted, glaucous; awns usually minute; blades usually rather rigid_____15. F. arizonica.
Lower lemmas not over 5 mm. long; spikelets mostly 3 to 5-flowered; blades short, densely tufted at base of plant.
Base of plants brown felty-fibrous; a callus sometimes seen at base of lower blades on either side (obscure and not constant); lower lemmas (excluding awns) usually about 5 mm. long_____16. F. calligera.
Base of plants not brown felty-fibrous; no callus found; lower lemmas (excluding awns) 3.5 to 4.5 mm. long.
17. F. saximontana.

1. Festuca octoflora Walt. Fl. Carol. 81. 1788.

Plains of the Covillea belt, upward to the spruce belt. Throughout the United States.

1a. Festuca octoflora hirtella Piper, Contr. U. S. Nat. Herb. **10**: 12. 1906.

Arid plains and open hillsides. California and Nevada to Arizona and New Mexico.

2. Festuca arida Elmer, Bot. Gaz. **36**: 52. 1903.

Plains and dry hillsides. Washington to California and Nevada.

3. Festuca pacifica Piper, Contr. U. S. Nat. Herb. **10**: 12. 1906.

Plains and dry hillsides of the Covillea belt, upward to the yellow pine belt. British Columbia to New Mexico and Lower California.

4. Festuca reflexa Buckl. Proc. Acad. Phila. **1862**: 98. 1863.

Plains and dry hillsides of the Covillea belt, upward to the yellow pine belt. British Columbia to Arizona and California.

5. Festuca megalura Nutt. Journ. Acad. Phila. n. ser. **1**: 188. 1847.

Plains and dry hillsides, upward to pinyon and yellow pine belts. British Columbia to Arizona, Lower California, and South America.

6. Festuca confinis Vasey, Bull. Torrey Club **11**: 126. 1884.

Pinyon belt, upward to 3,300 meters. Montana to Colorado, Oregon, and California.

7. Festuca elatior L. Sp. Pl. 75. 1753. MEADOW FESCUE.

In meadows and canyons, upward to 2,400 meters. Introduced from Europe throughout the cooler portions of America.

7a. Festuca elatior arundinacea Hack. Monogr. Fest. Eur. 152. 1882.

Logan, Utah. Introduced from Europe.

8. Festuca sororia Piper, Contr. U. S. Nat. Herb. **16**: 197. 1913.

Aspen and spruce belts. Colorado, New Mexico, Utah, and Arizona.

9. Festuca subulata Trin. in Bong. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. **2**: 173. 1832.

Aspen, spruce, and alpine belts. Alaska to Utah and California.

10. Festuca thurberi Vasey in Wheeler, Rep. U. S. Surv. 100th Merid. 6: 292. *pl. 29.* 1879.

Spruce and subalpine belts. Wyoming to Utah and New Mexico.

11. Festuca rubra L. Sp. Pl. 74. 1753.

Aspen and spruce belts. Subarctic America to Virginia, Colorado, and California; also in Europe and Asia.

12. Festuca viridula Vasey, U. S. Dept. Agr. Div. Bot. Bull. 13²: *pl. 93.* 1893.

Meadows and dry slopes, at 1,800 to 2,700 meters. Washington and Idaho to Nevada and California.

13. Festuca brachyphylla Schult. Mant. 3: 646. 1827.

Festuca minutiflora Rydb. Bull. Torrey Club 32: 608. 1905.

Spruce and alpine belts, upward to 3,300 meters or more. Arctic America to New Hampshire, New Mexico, and California.

14. Festuca idahoensis Elmer, Bot. Gaz. 36: 53. 1903.

Aspen and spruce belts. Alberta and British Columbia, southward to Colorado and California.

15. Festuca arizonica Vasey, Contr. U. S. Nat. Herb. 1: 277. 1893.

Aspen and spruce belts. New Mexico and Arizona to Utah and Oregon.

16. Festuca calligera (Piper) Rydb. Bull. Torrey Club 36: 537. 1909.

Festuca ovina calligera Piper, Contr. U. S. Nat. Herb. 10: 27. 1906.

Spruce and alpine belts. Doubtfully distinct from No. 17. Utah and Arizona.

17. Festuca saximontana Rydb. Bull. Torrey Club 36: 536. 1909.

Spruce belt. Minnesota to Alaska, southward in the Rocky Mountains to Colorado and Utah.

52. BROMUS L. Bromegrass

Plants annual; introduced species.

Awn twisted, geniculate; lemma pubescent, its apex produced into 2 aristate teeth ---------- 1. B. trinii.

Awn not twisted nor geniculate; apex of lemma hyaline, not aristate.

Lemmas narrow, gradually acuminate, the awn as long as the body of the lemma or longer.

Panicle drooping; pedicels capillary; second glume not over 10 mm. long.

Lemmas conspicuously pilose ---------- 2. B. tectorum.

Lemmas glabrous or scabrous ---------- 2a. B. tectorum nudus.

Panicle erect or somewhat nodding; pedicels stiff; second glume over 12 mm. long or, if only 10 mm., the panicles erect and compact.

Panicle compact, erect ---------- 3. B. rubens.

Panicle open, slightly nodding.

Lemma and awn not over 4 cm. long; first glume about 8 mm. long. 4. B. sterilis.

Lemma and awn 6 to 8 cm. long; first glume about 15 mm. long. 5. B. rigidus.

Lemmas broad, abruptly narrowed above, the awn mostly shorter than the body of the lemma.

Lemmas awnless, or nearly so.

Spikelets inflated; lemmas obtuse ---------- 12. B. brizaeformis.

Spikelets flattened; lemmas acuminate or bearing an awn not over 2 mm. long ---------- 16. B. unioloides.

Lemmas awned.
Panicle contracted, usually dense, erect or nearly so.
Lemmas pubescent ---- 6. B. hordeaceus.
Lemmas glabrous ---- 7. B. racemosus.
Panicle loose, nodding or drooping.
Sheaths and lemmas glabrous ---- 11. B. secalinus.
Sheaths pubescent; lemmas pubescent or glabrous.
Spikelets villous, drooping on capillary pedicels. Awns slender, nearly as long as the body of the lemma ---- 8. B. arenarius.
Spikelets glabrous or minutely scabrous.
Awns becoming divergent; lower panicle branches elongate, naked for two-thirds their length, drooping. 9. B. japonicus.
Awns straight; lower panicle branches not elongate, stiffer, the panicle nodding ---- 10. B. commutatus.
Plants perennial, some species blooming the first year; native species.
Plants with running rhizomes; spikelets awnless ---- 20. B. inermis.
Plants tufted, with no running rhizomes; spikelets awn-tipped.
Spikelets not distinctly flattened, the lemmas not keeled. Panicle open, the branches spreading or drooping.
Lemmas pubescent along the margin and on the back near the base, glabrous or nearly so on the back above ---- 13. B. richardsoni.
Lemmas pubescent rather evenly throughout.
Panicle branches laxly drooping; spikelets conspicuously villous. 14. B. porteri.
Panicle branches short, stiffly spreading; spikelets minutely pubescent. 15. B. orcuttianus.
Spikelets flattened even when young, the lemmas keeled toward the apex, awned.
Blades canescent and pilose, narrow or involute; panicle narrow, erect ---- 17. B. subvelutinus.
Blades not canescent, glabrous or sparsely pilose.
Lemmas pubescent, at least toward the margin and base. 18. B. marginatus.
Lemmas glabrous or scabrous ---- 19. B. polyanthus.

1. Bromus trinii Desv. in Gay, Fl. Chil. 6: 441. 1853.

Plains and rocky hillsides of the Covillea belt, upward to the spruce belt; introduced from South America. California to Colorado, Mexico, and South America.

2. Bromus tectorum L. Sp. Pl. 77. 1753.

Fields, waste places, canyons, and mountain sides, upward to 2,000 meters; introduced from Europe. Massachusetts to Mississippi, California, and British Columbia.

2a. Bromus tectorum nudus Klett & Richt. Fl. Leipzig 109. 1830.

Dry ground of the artemisia belt and along Great Salt Lake. Introduced from Europe into western United States.

3. Bromus rubens L. Cent. Pl. 1: 5. 1755.

Bartlett Creek, northern Nevada; introduced from southern Europe.

4. Bromus sterilis L. Sp. Pl. 77. 1753.

Hillsides about Salt Lake City; introduced from Europe. Ontario to Alabama, Colorado, and California.

5. Bromus rigidus Roth in Roem. & Ust. Mag. Bot. **4**: 21. 1790.

Bromus villosus Forsk. Fl. Aegypt. Arab. 23. 1775. Not *B. villosus* Scop. 1772.

Fields and canyons about settlements; introduced from Mediterranean region.

6. Bromus hordeaceus L. Sp. Pl. 77. 1753. SOFT CHEAT.

Fields, waste places, and dry hillsides, upward to 2,000 meters. Introduced from Europe.

7. Bromus racemosus L. Sp. Pl. ed. 2. 114. 1762.

Fields, canyons, and along roads about settlements; introduced from Europe.

8. Bromus arenarius Labill. Nov. Holl. Pl. 1: 23. 1804.

About settlements, Reno, Nevada; introduced from Australia.

9. Bromus japonicus Thunb. Fl. Japon. 52. 1784.

About settlements, Salt Lake City; introduced from Asia.

10. Bromus commutatus Schrad. Fl. Germ. 353. 1806.

Fields, waste places, and canyons. Introduced throughout the northern United States, but not common.

11. Bromus secalinus L. Sp. Pl. 76. 1753. CHEAT.

Fields and waste places; introduced from Europe. Throughout the United States.

12. Bromus brizaeformis Fisch. & Mey. Ind. Sem. Hort. Petrop. **3**: 30. 1837.

Fields, canyons, and hillsides, near settlements; introduced from the Old World. Massachusetts to Delaware, California, and British Columbia.

13. Bromus richardsoni Link, Hort. Berol. **2**: 281. 1833.

Aspen and spruce belts. Saskatchewan to New Mexico and Arizona.

14. Bromus porteri (Coulter) Nash, Bull. Torrey Club **22**: 512. 1895.

Bromus kalmii porteri Coulter, Man. Rocky Mount. 425. 1885.

Aspen belt, upward to 3,300 meters. Montana and South Dakota to New Mexico and Arizona.

15. Bromus orcuttianus Vasey, Bot. Gaz. **10**: 23. 1885.

Open woods and stony hillsides, at 1,200 to 1,500 meters. Washington to Utah, Arizona, and California.

16. Bromus unioloides H. B. K. Nov. Gen. & Sp. **1**: 151. 1815.

Festuca unioloides Willd. Hort. Berol. **1**: 3. *pl. 3.* 1816.

Introduced about settlements. South Carolina to Texas, and California to Mexico.

17. Bromus subvelutinus Shear, U. S. Dept. Agr. Div. Agrost. Bull. **23**: 52. 1900.

Meadows and hillsides, at 1,200 to 1,500 meters. Wyoming to Oregon and California.

18. Bromus marginatus Nees; Steud. Syn. Pl. Glum. **1**: 322. 1854.

Canyons and mountain sides, at 1,500 to 3,000 meters. Intergrades with No. 19. British Columbia to Colorado and California.

19. Bromus polyanthus Scribn. in Shear, U. S. Dept. Agr. Div. Agrost. Bull. **23**: 56. *f. 34.* 1900.

Aspen and spruce belts, occasionally found in the lower canyons. Montana to New Mexico, Utah, and Oregon.

20. Bromus inermis Leyss. Fl. Hal. 16. 1761. COMMON BROMEGRASS.

In cultivation and often escaped. Native of Central Europe.

53. LOLIUM L.

Lemmas awned.....1. L. multiflorum.
Lemmas awnless.....2. L. perenne.

1. **Lolium multiflorum** Lam. Fl. Franc. 621. 1778. ITALIAN RYEGRASS.
Fields and canyons; Provo, Utah; Reno, Nevada; introduced from Europe.

2. **Lolium perenne** L. Sp. Pl. 83. 1753. PERENNIAL RYEGRASS.
Waste places and along roads; introduced from Europe.

54. AGROPYRON Beauv. WHEATGRASS

Plants producing creeping rhizomes.
Glumes and lemmas not awn-pointed, the glumes 4 to 8 mm. long.
Lemmas pubescent.....1. A. dasystachyum.
Lemmas glabrous or scabrous only.....2. A. riparium.
Glumes and lemmas awn-pointed, at least the second glume 10 mm. long or more.
Sheaths glabrous.
Lemmas glabrous.....3. A. smithii.
Lemmas minutely pubescent.....3a. A. smithii molle.
Sheaths pubescent.....3b. A. smithii palmeri.
Plants not producing rhizomes.
Blades strongly involute, not over 3 mm. wide, flattened out. Culms slender, wiry, densely tufted; glumes narrow, the margin thin, commonly ragged.
Lemmas awnless.....4. A. inerme.
Lemmas awned, the awn finally recurved.....5. A. spicatum.
Blades not involute or on the margins only or, if dried involute, the glumes with firm margins.
Rachis disarticulating. Glumes and lemmas long-awned, the awns often dividing.....10. A. saxicola.
Rachis continuous, the florets falling from the persistent glumes.
Glumes and lemmas conspicuously awned.
Awns recurved; blades 2 to 4 mm. broad.....6. A. pringlei.
Awns erect; blades 4 to 10 mm. broad.
Culms mostly 1 meter tall; blades lax, commonly 6 to 10 mm. broad; spikes relatively slender.....9. A. caninum.
Culms mostly not over 50 cm. tall; blades firm, 4 to 6 mm. broad; spikes relatively thick.....8a. A. violaceum andinum.
Glumes awnless or awn-tipped.
Spikes dense; plants mostly not over 60 cm. tall.....8. A. violaceum.
Spikes relatively slender; plant tall.....7. A. tenerum.

1. **Agropyron dasystachyum** (Hook.) Scribn. Bull. Torrey Club **10**: 78. 1883.
Triticum repens dasystachyum Hook. Fl. Bor. Amer. **2**: 254. 1840.
Valleys, canyons, and mountain meadows, upward to 3,000 meters. Hudson Bay to Michigan, Idaho, and Saskatchewan.

2. **Agropyron riparium** Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. **4**: 35. 1897.
Gravelly banks, dry hillsides, and sage plains. North Dakota to Washington, Colorado, and Nevada.

3. **Agropyron smithii** Rydb. Mem. N. Y. Bot. Gard. **1**: 64. 1900. BLUESTEM.
Alkaline plains (artemisia belt), canyons, and mountainsides, upward to 2,700 meters. Wisconsin to Texas, Arizona, and Washington.

3a. Agropyron smithii molle (Scribn. & Smith) Jones, Contr. West. Bot. 14: 18. 1912.

Agropyron spicatum molle Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 33. 1897.

Meadows, canyons, and hillsides of the artemisia belt, upward to 2,700 meters. Saskatchewan to Colorado and New Mexico, westward to Idaho and Washington.

3b. Agropyron smithii palmeri (Scribn. & Smith) Heller, Cat. N. Amer. Pl. ed. 2. 3. 1900.

Agropyron spicatum palmeri Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 33. 1897.

Meadows, at 1,500 to 2,100 meters; southern Utah. Colorado, New Mexico, Utah, and Arizona.

4. Agropyron inerme (Scribn. & Smith) Rydb. Bull. Torrey Club 36: 539. 1909.

Agropyron divergens inerme Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 27. 1897.

Plains and dry hillsides, upward to the aspen belt. British Columbia to Nebraska, Utah, and Oregon. Intergrades with *A. spicatum*.

5. Agropyron spicatum (Pursh) Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 33. 1897. BUNCH WHEATGRASS.

Festuca spicata Pursh, Fl. Amer. Sept. 1: 83. 1814.

Artemisia plains, foothills, and canyons, upward to 3,000 meters. Montana and British Columbia, southward to Arizona and California.

6. Agropyron pringlei (Scribn. & Smith) Hitchc. in Jepson, Fl. Calif. 1: 183. 1912.

Agropyron gmelini pringlei Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 31. 1897.

With sagebrush, North Twin River, Toiyabe National Forest. Nevada and California.

7. Agropyron tenerum Vasey, Bot. Gaz. 10: 258. 1885. SLENDER WHEATGRASS.

Foothills, canyons, and mountain sides, upward to 3,000 meters. Maine to Alaska, southward to New Mexico and California.

8. Agropyrum violaceum (Hornem.) Lange, Consp. Fl. Groenland. 3: 155. 1880.

Triticum violaceum Hornem. Fl. Dan. *pl. 2044*. 1832.

Spruce and subalpine belts. Arctic America to Pennsylvania, Arizona, and Nevada.

8a. Agropyron violaceum andinum Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 30. 1897.

Spruce belt; Nevada. Intergrades with the species and with No, 8. New Hampshire to Montana, Colorado, and Nevada.

9. Agropyron caninum (L.) Beauv. Ess. Agrost. 102, 146. 1812.

Triticum caninum L. Sp. Pl. 86. 1753.

Aspen and spruce belts. Ontario to Alaska, southward to Michigan, New Mexico, and California.

10. Agropyron saxicola (Scribn. & Smith) Piper, Contr. U. S. Nat. Herb 11: 148. 1906.

Elymus saxicola Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 11: 56. *pl. 15*. 1898.

Canyons and mountain sides, upward to 3,000 meters. Washington to South Dakota, Arizona, and California.

55. HORDEUM L. Barley

Plants annual.
- Spikes not over 1 cm. wide. Glumes of fertile spikelet dilated above the base ..... 1. H. pusillum.
- Spikes nearly or quite 2 cm. wide.
  - Glumes dilated above the base, ciliate ..... 2. H. murinum.
  - Glumes awl-shaped, not dilated, not ciliate ..... 3. H. gussoneanum.

Plants perennial: Glumes very slender.
- Spikes not over 1 cm. wide; awns usually not over 1 cm. long, narrowly ascending ..... 4. H. nodosum.
- Spikes 3 to 10 cm. wide; awns 2 to 6 cm. long, spreading.
  - Awns 2 to 3 cm. long ..... 5. H. caespitosum.
  - Awns 4 to 6 cm. long ..... 6. H. jubatum.

1. Hordeum pusillum Nutt. Gen. Pl. 1: 87. 1818.

Plains and valleys, upward to 1,800 meters. Ontario to Georgia, westward to British Columbia and California.

2. Hordeum murinum L. Sp. Pl. 85. 1753.

Fields and waste places about settlements; introduced from Europe.

3. Hordeum gussoneanum Parl. Fl. Palerm. 1: 246. 1845.

Saline flats and along ditches about settlements; introduced from Europe.

4. Hordeum nodosum L. Sp. Pl. ed. 2. 126. 1762.

Foothills, canyons, and mountain meadows, upward to 3,000 meters. Temperate North America, Europe, and Asia.

5. Hordeum caespitosum Scribn. Proc. Davenport Acad. 7: 245. 1899.

Wet meadows and along streams at 1,500 to 2,700 meters. Saskatchewan to Kansas, westward to Arizona and Washington.

6. Hordeum jubatum L. Sp. Pl. 85. 1753.

Desert areas, foothills, and canyons, upward to 2,700 meters. Labrador to Alaska, southward to New Jersey, Texas, and California.

56. ELYMUS L. Wild-rye

Lemmas awnless or awn-tipped only; glumes tapering from base to summit.
- Plants producing long creeping rhizomes ..... 1. E. triticoides.
- Plants densely tufted, without rhizomes or with very short thick ones.
  - Blades 2 to 3 mm. wide, involute, densely aggregate at the base. Spikelets commonly single ..... 5. E. salinus.
  - Blades mostly 5 to 10 mm. wide, flat or nearly so, not aggregate at the base. Plants commonly 1 meter or more tall.
    - Lemmas awn-tipped ..... 2. E. ambiguus.
    - Lemmas awnless or mucronate.
      - Sheaths, blades, and culm glabrous or scabrous ..... 3. E. condensatus.
      - Sheaths, blades, and culm cinereous-pubescent ..... 4. E. cinereus.

Lemmas distinctly awned; glumes broadened above the base, 1 to 5-nerved.

Glumes 1 or 2-nerved, almost subulate. Rachis disarticulating. 6. E. macounii.

Glumes mostly 2 to 4-nerved, distinctly broadened above the base.
- Spikes erect; awns mostly less than 2 cm. long, ascending; glumes distinctly 3 or 4-nerved to the base ..... 7. E. glaucus.
- Spikes drooping; awns mostly 2.5 to 3 cm. long, flexuous, divergent; glumes 2 or 3-nerved, the nerves usually obscure at base ..... 8. E. canadensis.

1. **Elymus triticoides** Buckl. Proc. Acad. Phila. **1862**: 99. 1863.

Valleys, plains, mountain sides, and canyons, upward to 2,700 meters. Alberta to Washington, southward to Colorado, Arizona, and California.

2. **Elymus ambiguus** Vasey & Scribn. Contr. U. S. Nat. Herb. **1**: 280. 1893.

Aspen and spruce belts; not yet found in Utah and Nevada. Montana to Colorado and northern Arizona.

3. **Elymus condensatus** Presl, Rel. Haenk. **1**: 265. 1830.

Plains, mountain sides, and canyons, upward to 3,000 meters. Alberta and British Columbia, to California and Nebraska.

4. **Elymus cinereus** Scribn. & Merr. Bull. Torrey Club **29**: 467. 1902.

On plains; Lone Mountain, Austin, and Pahrump Valley. Nevada and California.

5. **Elymus salinus** Jones, Proc. Calif. Acad. II. **5**: 725. 1895.

Alkaline soil of plains, canyons, and slopes, upward to 2,500 meters. Wyoming and Utah.

6. **Elymus macounii** Vasey, Bull. Torrey Club **13**: 119. 1886.

Plains and foothills. Manitoba and Alberta to New Mexico and Nevada.

7. **Elymus glaucus** Buckl. Proc. Acad. Phila. **1862**: 99. 1863.

Foothills and canyons, upward to 3,000 meters. Alaska to the Great Lakes, New Mexico, and California.

8. **Elymus canadensis** L. Sp. Pl. 83. 1753.

Plains and foothills. Nova Scotia to Georgia, westward to British Columbia and California.

57. SITANION Raf.

Glumes or some of them 3 or 4-nerved, relatively broad, entire or bifid, but not to the base; awns mostly less than 3 cm. long_____1. S. insulare.
Glumes subulate, 1 or 2-nerved, entire or cleft into 2 to several awns; awns, or some of them, over 5 cm. long.
Glumes entire or 2-cleft to the base; awns relatively stout____2. S. hystrix.
Glumes unequally cleft but not to the base into 3 to several awns; awns relatively delicate.
Plants glabrous or scabrous, or the blades puberulent.
3. S. breviaristatum.
Plants conspicuously cinereous-puberulent_____4. S. cinereum.

1. **Sitanion insulare** J. G. Smith, U. S. Dept. Agr. Div. Agrost. Bull. **18**: 14. 1899.

Plains and foothills, near Salt Lake, Utah, and Kings Canyon, Nevada. Utah and Nevada.

2. **Sitanion hystrix** (Nutt.) J. G. Smith, U. S. Dept. Agr. Div. Agrost. Bull. **18**: 15. 1899.

Aegilops hystrix Nutt. Gen. Pl. **1**: 86. 1818.

Plains, foothills, and canyons, upward to 2,700 meters. New Brunswick to Georgia, Texas, and California.

3. **Sitanion breviaristatum** J. G. Smith, U. S. Dept. Agr. Div. Agrost. Bull. **18**: 12. 1899.

Plains and open gravelly slopes and canyons, upward to 3,000 meters. Utah to California.

4. Sitanion cinereum J. G. Smith, U. S. Dept. Agr. Div. Agrost. Bull. 18: 14. 1899.

Dry hills; Reno and Summit Lake region. Probably only a cinereous form of No. 3. Nevada.

17. CYPERACEAE. Sedge Family

Grasslike annuals or perennials with mostly solid culms; leaves 3-ranked, the sheaths closed; flowers perfect, monoecious, or dioecious; perianth of bristles, a sac-like perigynium, or none; stamens 1 to 3, the anthers 2-celled; ovary 1-celled, 1-ovuled; style 1; stigmas 2 or 3; fruit an achene.

Flowers monoecious or dioecious, spicate.

Achenes enclosed in a perigynium; glumes 1-flowered_____11. CAREX.

Achenes not enclosed in a perigynium; glumes 2-flowered. Spikelets 2-flowered, 1 staminate with 3 stamens, 1 pistillate with 1 style and 3 stigmas; achenes 3-angled; tufted perennial, 10 to 40 cm. high, with filiform leaves_____10. ELYNA.

Flowers all, or at least one, perfect or polygamous. Spikelets similar.

Glumes of spikelets 2-ranked. Mostly subscapose annuals or perennials; stems triangular; inflorescence capitate or umbellate; stamens 1 to 3; styles 2 or 3.

Bristles (perianth) none; achenes without tubercles_____2. CYPERUS.

Bristles 6; achenes with a short beak. Rigid tufted perennial with subterete channeled leaves and black sheaths; flowers capitate. 8. SCHOENUS.

Glumes of spikelets spirally disposed.

Style enlarged at base and persistent as a tubercle. Stamens and stigmas 2 or 3; achenes lenticular or triangular.

Spikelet 1; scapose annuals or perennials; leaves reduced to sheaths; perianth of 1 to 12 bristles_____5. ELEOCHARIS.

Spikelets numerous; tufted annual with filiform leaves; perianth none. 6. STENOPHYLLUS.

Style not enlarged at base or, if enlarged, the base not persistent as a tubercle.

Plants annual, 10 cm. high or less, with filiform stems and leaves.

Spikelets terete, 4 to 8 mm. long, solitary or in small clusters; glumes (in our species) rhombic-obovate, long-beaked; achenes obovate, black_____1. HEMICARPHA.

Plants perennial or annual.

Bristles (perianth) none. Plants 30 cm. high or more.

Spikelets capitate or umbellate, cylindric-oblong, 10 to 25 mm. long; glumes brown, ovate, mucronate, pubescent; achenes obovoid, mucronate_____7. FIMBRISTYLIS.

Spikelets in cymelike panicles, ovate-oblong, 5 mm. long; glumes brown, ovate, acute, glabrous; achenes pyriform; stems 1 meter high or more_____9. CLADIUM.

Bristles present.

Bristles elongate, woolly, numerous, white; style 3-cleft; spikelets in terminal involucrate umbels; achenes obovoid, 3-angled, light brown_____3. ERIOPHORUM.

Bristles short, barbed or smooth; stamens and stigmas 2 or 3; spikelets capitate or umbellate_____4. SCIRPUS.

1. HEMICARPHA Nees & Arn.

1. Hemicarpha aristulata (Coville) Smyth, Trans. Kans. Acad. **16**: 163. 1899.
Hemicarpha micrantha aristulata Coville, Bull. Torrey Club **21**: 36. 1894.

Moist soil and on river banks. Utah and Nevada(?). Kansas to Texas, California, and Washington.

2. CYPERUS L. FLAT-SEDGE

Annuals with slender stems; spikelets capitate, 4 to 8 mm. long, terminal or in umbels; rachis not winged. Leaves 1 to 2 mm. wide.
- Glumes awned, several-nerved——1. C. inflexus.
- Glumes acuminate, 3-nerved——2. C. acuminatus.

Annuals or perennials, 30 cm. high or more; stems stout (except in No. 5), 3-angular; inflorescence of umbellate spikes; spikelets linear; rachis winged. Involucral leaves exceeding the inflorescence.
- Rachis of spikelets deciduous, the two lower glumes only persistent. Spikelet 6 to 25 mm. long, 2 mm. wide or less; glumes straw-colored, oblong-lanceolate, many-nerved——3. C. strigosus.
- Rachis of spikelets persistent.
  - Spikelets densely crowded; flowers numerous, about 20 to the spikelet; glumes chestnut-brown; plants stout——4. C. erythrorhizos.
  - Spikelets fewer, loosely clustered; flowers about 12 to the spikelet; glumes red-margined; plants slender——5. C. sphacelatus.

1. Cyperus inflexus Muhl. Descr. Gram. 16. 1817.

Wet places in valleys and on plains of the Covillea and artemisia belts. New Brunswick to Florida, westward to British Columbia and Mexico.

2. Cyperus acuminatus Torr. & Hook. Ann. Lyc. N. Y. **3**: 435. 1836.

Wet places; collected in states surrounding the Great Basin. Illinois to Louisiana, westward to Washington, California, and Texas.

3. Cyperus strigosus L. Sp. Pl. 47. 1753.

Wet places on the plains; Idaho. Northern United States to tropical America.

4. Cyperus erythrorhizos Muhl. Descr. Gram. 20. 1817.

Wet places on the plains; Oregon. Throughout the United States.

5. Cyperus sphacelatus Rottb. Descr. Pl. 26. 1786.

Wet places of the Covillea and artemisia belts; southern Nevada. Southern United States, southward to tropical America.

3. ERIOPHORUM L. COTTON-SEDGE

Leaves triangular-channeled throughout; spikelets 2 to 4 (rarely more), the pedicels pubescent; achenes obovate-oblong——1. E. gracile.
Leaves flat, at least below the middle; spikelets 2 to 12, the pedicels smooth; achenes obovoid——2. E. angustifolium.

1. Eriophorum gracile Roth, Catal. Bot. **2**: 259. 1800.

Bogs and wet places, upward to 3,000 meters; Sierra Nevada. Quebec to Pennsylvania, Colorado, California, and British Columbia; also in Europe and Asia.

2. Eriophorum angustifolium Roth, Tent. Fl. Germ. **1**: 24. 1788.
Eriophorum ocreatum A. Nels. Bull. Torrey Club **29**: 400. 1902.

Bogs and wet meadows of the spruce and alpine belts; western Colorado and adjacent Wyoming. Newfoundland to Alaska, southward to Maine, Illinois, northern New Mexico, and Oregon.

4. SCIRPUS L. Bulrush

Involucral bracts of several flat leaves, exceeding the umbellate inflorescence.
  Style branches 2; achenes plano-convex; stems robust, often over one meter high.
    Spikelets 3 to 5 mm. long ovoid-oblong, disposed in a compound inflorescence, the rays unequal; glumes brown, the midvein green; leaves often 1 meter long; culms terete----------10. S. microcarpus.
    Spikelets 10 to 20 mm. long, cylindric-oblong, disposed in simple umbels or heads; glumes pale brown; leaves 50 cm. long or less; culms triangular. 11. S. paludosus.

Involucral bracts 1 or 2 or wanting.
  Involucral bracts wanting. Spikelets solitary, terminal, oblong, 3 to 6 mm. long; achenes obovate.
    Plant annual, with filiform stems, 2 to 5 cm. high; glumes with two brown bands and scarious margin----------1. S. coloradoensis.
    Plant a tufted perennial with triangular stems, 7 to 25 cm. high; glumes red-brown, with scarious margins----------2. S. pauciflorus.
  Involucral bracts present. Perennials.
    Bract scarcely exceeding the solitary (4 mm. long) spikelet. Glumes yellowish brown; achenes oblong, 3-angular; stems 10 to 40 cm. high. 3. S. caespitosus.
    Bract at least twice longer than the spikelet or heads.
      Stems triangular.
        Plant a tufted annual, 10 to 30 cm. high--------4. S. saximontanus.
        Plants perennial, 30 cm. to 2 meters high, with rootstocks.
          Involucral bract 4 to 10 cm. long. Spikelets acute; glumes awned, ovate, brown; achenes obovate, lenticular, brown; stems tough. 5. S. americanus.
          Involucral bracts 3 cm. long or less.
            Stem leafless or with one basal leaf; glumes ovate to orbicular, brown; filaments not exserted; style 2-cleft; achene lenticular; stem brittle----------6. S. olneyi.
            Stem leafy; glumes oblong, brownish; filaments long-exserted; style 3-cleft; achenes triangular; stem tough. 12. S. criniger.
      Stems terete.
        Inflorescence sessile. Spikelets ovate-oblong, 8 to 18 mm. long; glumes broadly ovate, acute or obtuse, dark brown; stems tough, 20 to 80 cm. high----------7. S. nevadensis.
        Inflorescence umbellate. Stems 1 to 3 meters high.
          Spikelets ovoid, 5 to 12 mm. long; glumes suborbicular to ovate, 2 mm. long, viscid-pubescent, the margin ciliate; stems brittle. 8. S. validus.
          Spikelets cylindric-oblong, 20 mm. long or less; glumes ovate-oblong, obtuse or emarginate, 3.5 to 4 mm. long, the margin scarious-lacerate; stems not brittle----------9. S. acutus.

1. Scirpus coloradoensis Britton, Torreya 4: 93. 1904.

Along lakes and ponds. Colorado to Nevada.

2. Scirpus pauciflorus Lightf. Fl. Scot. 1078. 1777.

Margins of ponds and in bogs of the spruce and alpine belts; Idaho and Wyoming. Quebec to British Columbia, southward to New York, New Mexico, and California; also in Europe and Asia.

3. Scirpus caespitosus L. Sp. Pl. 48. 1753.

Spruce and alpine belts; Colorado; possibly in the Uintahs. Greenland to Alaska, southward to Illinois, Colorado, and Washington; also in Europe and Asia.

4. Scirpus saximontanus Fernald, Rhodora 3: 251. 1901.

Wet places on plains, upward to the yellow pine belt. Wyoming and Utah, southward to Texas and Mexico.

5. Scirpus americanus Pers. Syn. Pl. 1: 68. 1805.

Swamps and wet places of the Covillea belt, upward to the yellow pine belt. Throughout North America; also in South America.

6. Scirpus olneyi A. Gray, Bost. Journ. Nat. Hist. 5: 238. 1845.

In marshes and along creeks of the Covillea and artemisia belts. New Hampshire to Florida, westward to Washington, California, and Mexico; also in the West Indies and Central America.

7. Scirpus nevadensis S. Wats. in King, Geol. Expl. 40th Par. 5: 360. 1871.

Along borders of brackish lakes and ponds of the artemisia belt. Washington to Nevada and California.

8. Scirpus validus Vahl, Enum. Pl. 2: 268. 1806.

Ponds and lakes of the artemisia belt, upward to the spruce belt. Nova Scotia to British Columbia, southward to the West Indies and Mexico.

9. Scirpus acutus Muhl.; Bigel. Fl. Bost. 15. 1814. TULE.

Scirpus lacustris occidentalis S. Wats. Bot. Calif. 2: 218. 1880.

Ponds and lakes of the Covillea belt, upward to the spruce belt. Newfoundland to British Columbia, southward to New York, New Mexico, and California.

10. Scirpus microcarpus Presl, Rel. Haenk. 1: 195. 1828.

Swamps, wet bottom lands, and along creeks of the artemisia, pinyon, and yellow pine belts. Nova Scotia to Alaska, southward to New York, New Mexico, and California.

11. Scirpus paludosus A. Nels. Bull. Torrey Club 26: 5. 1899.

Scirpus brittonianus Piper, Contr. U. S. Nat. Herb. 11: 157. 1906.

In salt marshes and wet meadows of the Covillea, artemisia, and pinyon belts. Quebec to Washington, southward to New Jersey, Kansas, Texas, and California.

12. Scirpus criniger A. Gray, Proc. Amer. Acad. 7: 392. 1868.

In bogs and ponds; Sierra Nevada. Oregon, California, and western Nevada.

5. ELEOCHARIS R. Br. SPIKE-RUSH

Style branches 2. Perennial with rootstocks; stems 30 to 150 cm. high; spikelet cylindric-oblong, 8 to 25 mm. long; glumes ovate-oblong, brown with scarious margins, the midrib green; achenes obovoid, the tubercle constricted ..... **1. E. palustris.**

Style branches 3. Perennials with rootstocks.

Plants 3 to 10 cm. high, with filiform stems; spikelets 3 to 10 mm. long, ovate-oblong. Achenes obovoid, the tubercle conic ..... **2. E. acicularis.**

Plants 15 cm. high or more; spikelets oblong to ovate-oblong, 4 to 12 mm. long.

Glumes ovate, obtuse, greenish yellow with darker midrib; achene obovoid, finely reticulate, the tubercle long-conic, not constricted at base. Stems often reclining and rooting at apex ..... **3. E. rostellata.**

Glumes oblong or ovate-oblong, brown with white margins; achenes obovoid, obscurely reticulate, the tubercle conic, constricted at base. **4. E. montana.**

1. Eleocharis palustris (L.) Roem. & Schult. Syst. Veg. **2**: 151. 1817.
Scirpus palustris L. Sp. Pl. 47. 1753.

In running water, marshes, and ponds of the artemisia belt, upward to the spruce belt. Throughout North America except in the extreme north; also in Europe and Asia.

2. Eleocharis acicularis (L.) Roem. & Schult. Syst. Veg. **2**: 154. 1817.
Scirpus acicularis L. Sp. Pl. 48. 1753.

Wet places of the artemisia belt, upward to the spruce belt. Throughout North America except in the extreme north; also in the Old World.

3. Eleocharis rostellata Torr. Fl. N. Y. **2**: 347. 1843.

About springs and in wet places of the Covillea, artemisia, pinyon, and yellow pine belts. Throughout North America except in the extreme south.

4. Eleocharis montana (H. B. K.) Roem. & Schult. Syst. Veg. **2**: 153. 1817.
Scirpus montanus H. B. K. Nov. Gen. & Sp. **1**: 226. 1816.

In running water and along pools of the Covillea, artemisia, and pinyon belts. Colorado to California, southward to South America.

6. STENOPHYLLUS Raf.

1. Stenophyllus capillaris (L.) Britton, Bull. Torrey Club **21**: 30. 1894.
Scirpus capillaris L. Sp. Pl. 49. 1753.

In valleys, Arizona; possibly absent from the Great Basin. Throughout North America except the extreme north; also in the Old World.

7. FIMBRISTYLIS Vahl

1. Fimbristylis thermalis S. Wats. in King, Geol. Expl. 40th Par. **5**: 360. 1871.

About hot springs in the Covillea and artemisia belts. Arizona, Nevada, and southern California.

8. SCHOENUS L.

1. Schoenus nigricans L. Sp. Pl. 43. 1753.

About springs and in marshy places; Ash Meadows, Nevada. Florida to Texas, southern Nevada, and California; also in Europe, Africa, and Asia.

9. CLADIUM P. Br. Sawgrass

1. Cladium mariscus (L.) R. Br. Prodr. Fl. Nov. Holl. **1**: 236. 1810.
Schoenus mariscus L. Sp. Pl. 42. 1753.
Cladium mariscus californicum S. Wats. Bot. Calif. **2**: 224. 1880.

Edges of pools and about warm springs; southern Nevada. Tropical and subtropical regions.

10. ELYNA Schrad.

1. Elyna bellardi (All.) K. Koch, Linnaea **21**: 616. 1848.
Carex bellardi All. Fl. Pedem. **2**: 264. *pl. 92, f. 2.* 1785.

Wet ground of the alpine belt; possibly in the Uintahs. Arctic America, southward in the Rocky Mountains to northern New Mexico.

11. CAREX L. Sedge

(Contributed by G. P. Van Eseltine)

Spike solitary.
  Leaf blades flat.
    Culms rarely 15 cm. tall; spike ovoid ..... 4. C. nigricans.
    Culms usually over 20 cm. tall; spike cylindric.
      Scales tan or straw-colored ..... 8. C. geyerii.
      Scales deep brown or blackish ..... 7. C. pseudoscirpoidea.

Leaf blades involute or filiform.
Rootstocks slender, creeping; stigmas 2.
Spike globose or subglobose; perigynia thin-walled, nerveless.
5. C. capitata.
Spike cylindric or subcylindric; perigynia thick-walled, nerved.
6. C. gynocrates.
Rootstocks short; plants densely cespitose; stigmas usually 3.
Staminate portion of the spike conspicuous; pistillate flowers few.
2. C. elynoides.
Staminate portion of the spike inconspicuous; pistillate flowers numerous.
Perigynia narrowly lanceolate, tapering to the beak___3. C. pyrenaica.
Perigynia obovate, abruptly contracted to form the beak.
1. C. hepburnii.
Spikes 2 or more.
Spikes usually uniform, with both pistillate and staminate flowers; stigmas 2; achenes lenticular; lateral spikes sessile.
Rootstocks long, creeping.
Spikes densely aggregate.
Perigynia numerous, closely appressed_____9. C. vernacula.
Perigynia few, looser_____11. C. stenophylla.
Spikes distinct.
Perigynia much flattened, thin-margined_____10. C. siccata.
Perigynia plano-convex, not thin-margined.
Rootstocks slender, light brown_____12 C. douglasii.
Rootstocks stout, dark brown.
Perigynia less than 2.5 mm. long; beak short, one-fifth as long as the body_____13. C. simulata.
Perigynia more than 2.5 mm. long; beak longer, one-third to one-half length of body.
Staminate flowers conspicuous; perigynia few (5 or less) in each spikelet_____14. C. latebrosa.
Staminate flowers inconspicuous; perigynia more numerous (7 to 10) in each spikelet_____15. C. praegracilis.
Rootstocks short, the culms densely cespitose.
Staminate flowers above the pistillate.
Culms capillary; perigynia terete_____16. C. disperma.
Culms stouter; perigynia flattened.
Spikes 10 or fewer, green or tinged with reddish brown.
Head ovoid, capitate_____17 C. hoodii.
Head cylindric, interrupted.
Leaves 1.5 mm. wide or more; scales equaling the perigynia.
18. C. occidentalis.
Leaves less than 1.5 mm. wide; scales one-half as long as perigynia_____19. C. vallicola.
Spikes more numerous, tawny or brownish when mature.
Beak of perigynia not longer than the body_____20. C. alma.
Beak of perigynia much longer than the body___21. C. stipata.
Staminate flowers below the pistillate.
Perigynia rounded or thin at the margin but not winged.
Mature spikes bristly with the spreading perigynia.
Perigynia narrowly lanceolate, the beak nearly as long as the body_____22. C. angustior.

Perigynia deltoid-lanceolate; beak much shorter___23. C. interior.
Mature spikes with perigynia appressed or ascending.
Perigynia 4 mm. long or more; spikes usually long-bracted.
24. C. bolanderi.
Perigynia shorter; spikes bractless or very short-bracted.
Spikes green; whole plant very glaucous_____25. C. canescens.
Spikes brown-tinged; plant slightly or not at all glaucous.
Terminal spike strongly clavate; beak of perigynium short, abrupt_____26. C. lachenalii.
Terminal spike at most slightly clavate; beak of perigynium longer, tapering_____27. C. heleonastes.
Perigynia strongly wing-margined.
Bracts long, exceeding the spikes_____28. C. athrostachys.
Bracts short, inconspicuous.
Scales equaling or exceeding the perigynia.
Perigynia 5 to 7 mm. long_____29. C. petasata.
Perigynia shorter.
Culms slender; heads flexuous_____30. C. praticola.
Culms stout; heads stiff.
Perigynia broad-winged, oblong-ovate_31. C. phaeocephala.
Perigynia very narrowly winged, narrowly lanceolate.
32. C. leporinella.
Scales shorter than the perigynia.
Beak of perigynium flat and serrulate to the tip.
Perigynia 5.5 to 7 mm. long, 3 mm. wide__33. C. egglestonii.
Perigynia shorter and narrower.
Spikes densely capitate; perigynia thin.
34. C. straminiformis.
Spikes in an oblong head; perigynia thick.
35. C. multicostata.
Beak of perigynium slender, terete, not serrulate.
Perigynia 4.5 to 6 mm. long.
Culms stiff; perigynia narrowly lanceolate, often falcate.
36. C. ebenea.
Culms slender; perigynia broader_____37. C. nubicola.
Perigynia 2 to 5 mm. long.
Margins of perigynia very narrow, the body lanceolate.
38. C. microptera.
Margins of perigynia broad, the body ovate-lanceolate or wider.
Perigynia 3.5 to 5 mm. long_____39. C. festivella.
Perigynia 2 to 3.5 mm. long_____40. C. subfusca.
Spikelets usually not uniform, some being entirely pistillate or entirely staminate; stigmas 3 and achenes trigonous; lateral spikes generally pedunculate, or stigmas 2, achenes lenticular, and the lateral spikes more or less pedunculate.
Achenes lenticular; stigmas 2.
Lowest bracts strongly sheathing.
Perigynia fleshy, yellow or orange_____41. C. aurea.
Perigynia membranous, whitish_____42. C. hassei.
Lowest bracts sheathless.
Perigynia strongly ribbed; beak more or less strongly bidentate.
43. C. nebraskensis.

Perigynia nerved or nerveless; beak not bidentate.
Leaves less than 2.5 mm. wide——44. C. kelloggii.
Leaves wider.
Lowest bract shorter than the inflorescence——45. C. concolor.
Lowest bract as long or longer than the inflorescence.
Perigynia turgid, spreading——46. C. aperta.
Perigynia not turgid, appressed——47. C. aquatilis.
Achenes trigonous, stigmas 3.
Beak of perigynia, if present, inconspicuously or not at all bidentate.
Perigynia pubescent, the body nearly globular, abruptly beaked.
48. C. rossii.
Perigynia glabrous.
Lowest bract long-sheathing.
Leaves 3 mm. wide or more; scales brown——49. C. fissuricola.
Leaves 2 mm. wide or less; scales white——50. C. capillaris.
Lowest bracts sheathless.
Perigynia glaucous.
Pistillate spikes drooping, on slender peduncles.
51. C. paupercula.
Pistillate spikes ascending, on stout peduncles.
52. C. buxbaumii.
Perigynia not glaucous. Scales dark-colored.
Terminal spike always staminate——53. C. raynoldsii.
Terminal spike with both pistillate and staminate flowers.
Perigynia 2.5 mm. or less in length.
Spikes clustered, less than 10 mm. long——54. C. halleri.
Spikes separate, some of them longer than 10 mm.
55. C. parryana.
Perigynia longer.
Lowest spike usually separate, long-peduncled.
Lateral spikes linear-cylindric——56. C. bella.
Lateral spikes broader.
Perigynia smooth; achenes long-stipitate.
57. C. epapillosa.
Perigynia roughish; achenes short-stipitate.
Lowest peduncle shorter than the spike; upper scales longer than the perigynia——58. C. chalciolepis.
Lowest peduncle as long as or longer than the spike; upper scales equaling or shorter than the perigynia——59. C. atrata.
Lowest spike approximate, usually sessile or short-peduncled.
Scales lanceolate, long-acuminate——60. C. heteroneura.
Scales broader, acutish to short-cuspidate.
Margins of scales broadly hyaline——61. C. albonigra.
Margins of scales narrowly or not all hyaline.
62. C. nova.
Beak of perigynia strongly bidentate.
Spikes short (2 cm. or less), subglobose to short-oblong, generally yellowish——63. C. viridula.
Spikes longer, linear-cylindric or long-oblong.
Perigynia pubescent——64. C. lanuginosa.

Perigynia glabrous.
Teeth 2 mm. long or more, spreading_____65. C. atherodes.
Teeth shorter.
Perigynia 8 to 10 mm. long, tapering to the beak.
66. C. exsiccata.
Perigynia shorter, contracted to the beak_____67. C. rostrata.

1. Carex hepburnei Boott in Hook. Fl. Bor. Amer. 2: 209. 1840.
Alpine belts. Alberta and British Columbia to Colorado.

2. Carex elynoides Holm, Amer. Journ. Sci. IV. 9: 356. 1900.
Spruce and alpine belts. Colorado to Nevada.

3. Carex pyrenaica Wahl. Svensk. Vet. Akad. Nya Handl. 24: 139. 1803.
Spruce and alpine belts. Mackenzie to Alaska, southward to Colorado; also in Europe.

4. Carex nigricans C. A. Meyer, Mém. Acad. St. Pétersb. Sav. Étrang. 1: 210. 1831.
Spruce and alpine belts. Alberta to Alaska, southward to Colorado and California.

5. Carex capitata L. Syst. Nat. ed. 10. 1261. 1759.
Alpine belt. Greenland to Alaska, southward to New Hampshire, Nevada (?), California, and Mexico; also in Europe.

6. Carex gynocrates Wormskjold; Drejer, Naturh. Tids. 3: 434. 1841.
Spruce and alpine belts. Greenland to Alaska, southward to New York, Michigan, and Colorado.

7. Carex pseudoscirpoidea Rydb. Mem. N. Y. Bot. Gard. 1: 78. 1900.
Spruce and alpine belts. Montana to Colorado and Nevada.

8. Carex geyerii Boott, Trans. Linn. Soc. Bot. 20: 118. 1846. ELK SEDGE.
Yellow pine, aspen, and spruce belts. Alberta to Washington, southward to Colorado, Utah, and Oregon.

9. Carex vernacula Bailey, Bull. Torrey Club 20: 417. 1893.
Alpine belt. Wyoming and Colorado, westward to Washington and California.

10. Carex siccata Dewey, Amer. Journ. Sci. I. 10: 278. 1826.
Wet meadows of the artemisia belt, upward to the spruce belt. Maine to Alberta, southward to New Jersey and Arizona.

11. Carex stenophylla Wahl. Svensk. Vet. Akad. Nya Handl. 24: 142. 1803.
Plains and mountain sides of the artemisia belt, upward to the spruce belt. Manitoba to Alaska, southward to New Mexico; also in Europe and Asia.

12. Carex douglasii Boott in Hook. Fl. Bor. Amer. 2: 213. *pl. 214.* 1839.
Plains and mountain sides, upward to the spruce belt. Manitoba to British Columbia, southward to Nebraska, New Mexico, and California.

13. Carex simulata Mackenz. Bull. Torrey Club 34: 604. 1908.
Yellow pine and spruce belts. Montana to Washington, southward to New Mexico and California.

14. Carex latebrosa Mackenz. Bull. Torrey Club 34: 603. 1908.
In meadows of the artemisia and pinyon belts. Nevada to New Mexico, southward to Mexico.

15. Carex praegracilis W. Boott, Bot. Gaz. 9: 87. 1884.

Plains and mountain sides of the Covillea belt, upward to the yellow pine belt. Manitoba to British Columbia, southward to Iowa and California, also in Mexico.

16. Carex disperma Dewey, Amer. Journ. Sci. I. 8: 226. 1824.

Aspen, spruce and alpine belts. Newfoundland to Alaska, southward to New Jersey, New Mexico, and California; also in Europe and Asia.

17. Carex hoodii Boott in Hook. Fl. Bor. Amer. 2: 211. 1840.

Yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to Colorado and California.

18. Carex occidentalis Bailey, Mem. Torrey Club 1: 14. 1889.

Yellow pine belt, upward to the subalpine belt. Wyoming, Utah, New Mexico, and Arizona.

19. Carex vallicola Dewey, Amer. Journ. Sci. II. 32: 40. 1861.

Plains and mountain sides of the Covillea belt, upward to the aspen belt. Wyoming to Oregon and Nevada.

20. Carex alma Bailey, Mem. Torrey Club 1: 50. 1889.

Canyons and mountain sides of the yellow pine and aspen belts. California and Nevada.

A specimen from Slide Mountain seems to have broader perigynia, and may represent a new species, but the material is incomplete.

21. Carex stipata Muhl.; Willd. Sp. Pl. 4: 233. 1805.

Plains and foothills of the artemisia and pinyon belts. Newfoundland to British Columbia, southward to Florida, Utah, and California.

22. Carex angustior Mackenz.; Rydb. Fl. Rocky Mount. 14. 1917.

Yellow pine belt, upward to the subalpine belt. Nova Scotia to Washington, southward to Maryland and Nevada.

23. Carex interior Bailey, Bull. Torrey Club 20: 426. 1893.

Swamps and wet places of the artemisia belt, upward to the subalpine belt. United States and northern Mexico.

24. Carex bolanderi Olney, Proc. Amer. Acad. 7: 393. 1868.

Pinyon, yellow pine, and aspen belts. Montana to British Columbia, southward to New Mexico and California.

25. Carex canescens L. Sp. Pl. 974. 1753.

Yellow pine belt, upward to the subalpine belt. Labrador to Alaska, southward to Virginia and California; also in Europe, Asia, Australia, and South America.

26. Carex lachenalii Schkuhr, Beschr, Riedgr. 1: 51. 1801.

Alpine belt. Greenland to Alaska, southward to Colorado; also in Europe and Asia.

27. Carex heleonastes L. f. Suppl. Pl. 414. 1781.

Alpine belt. Ontario to British Columbia; also in Europe and Asia.

28. Carex athrostachys Olney, Proc. Amer. Acad. 7: 393. 1863.

Yellow pine, aspen, and spruce belts. Saskatchewan to Alaska, southward to Colorado and California.

29. Carex petasata Dewey, Amer. Journ. Sci. I. 29: 246. 1836.

Yellow pine, aspen and spruce belts. Saskatchewan to Washington, southward to Colorado and Nevada.

30. Carex praticola Rydb. Mem. N. Y. Bot. Gard. 1: 84. 1900.

Yellow pine belt, upward to the subalpine belt. Greenland to Alaska, southward to Maine, Colorado, and California.

31. Carex phaeocephala Piper, Contr. U. S. Nat. Herb. 11: 172. 1906.

Spruce and alpine belts. Alberta and British Columbia, southward to Colorado and California.

32. Carex leporinella Mackenz. Bull. Torrey Club 43: 605. 1917.

Yellow pine and aspen belts. California and Nevada.

33. Carex egglestonii Mackenz. Bull. Torrey Club 42: 614. 1915.

Spruce and subalpine belts. Wyoming, Colorado, and Utah.

34. Carex straminiformis Bailey, Mem. Torrey Club 1: 24. 1889.

Spruce and subalpine belts. California and Nevada.

35. Carex multicostata Mackenz. Bull. Torrey Club 43: 604. 1917.

Yellow pine and aspen belts. California and Nevada.

36. Carex ebenea Rydb. Bull. Torrey Club 28: 266. 1901.

Spruce and alpine belts. Wyoming to New Mexico, Utah, and Arizona.

37. Carex nubicola Mackenz. Bull. Torrey Club 36: 480. 1909.

Spruce and alpine belts. Alberta to Oregon, southward to Colorado and Nevada.

38. Carex microptera Mackenz. Muhlenbergia 5: 56. 1909.

Yellow pine, aspen, and spruce belts. Alberta to Washington, southward to Wyoming and Oregon.

39. Carex festivella Mackenz. Bull. Torrey Club 42: 609. 1915.

Yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to New Mexico, Arizona, and Nevada.

40. Carex subfusca W. Boott in S. Wats. Bot. Calif. 2: 234. 1880.

Canyons and mountain sides of the pinyon and yellow pine belts. California and Nevada.

41. Carex aurea Nutt. Gen. Pl. 2: 205. 1818. GOLDEN SEDGE.

Plains and hillsides of the artemisia belt, upward to the subalpine belt. Newfoundland to British Columbia, southward to Connecticut, New Mexico, and California.

42. Carex hassei Bailey, Bot. Gaz. 21: 5. 1896.

Yellow pine belt, upward to the subalpine belt. Labrador to Alaska, southward to Pennsylvania, Utah, and California.

43. Carex nebraskensis Dewey, Amer. Journ. Sci. II. 18: 102. 1854.

Meadows and swamps of the artemisia, pinyon, and yellow pine belts. South Dakota to Kansas, westward to British Columbia, New Mexico, and California.

44. Carex kelloggii W. Boott in S. Wats. Bot. Calif. 2: 240. 1880.

Yellow pine, aspen, and spruce belts. Colorado to California and Alaska.

45. Carex concolor R. Br. Suppl. App. Parry's Voy. 283. 1824.

Alpine belt. Greenland to Alaska, southward to New Hampshire and Colorado; also in Europe and Asia.

46. Carex aperta Boott in Hook Fl. Bor. Amer. 2: 218. 1840.

Yellow pine and aspen belts. Montana to British Columbia, southward to Utah and California.

47. Carex aquatilis Wahl. Svensk. Vet. Akad. Nya Handl. **24**: 165. 1803.

Wet meadows and swamps of the spruce and subalpine belts. Labrador to Alaska, southward to Quebec, New Mexico, and California.

48. Carex rossii Boott in Hook. Fl. Bor. Amer. **2**: 222. 1840.

Yellow pine, aspen, spruce, and subalpine belts. Michigan to California and British Columbia.

49. Carex fissuricola Mackenz. Muhlenbergia **5**: 53. 1909.

Meadows of the spruce and alpine belts. California and Nevada.

50. Carex capillaris L. Sp. Pl. 977. 1753.

Alpine belt. Greenland to Alaska, southward to Colorado and Nevada; also in Europe and Asia.

51. Carex paupercula Michx. Fl. Bor. Amer. **2**: 172. 1803.

Bogs of the yellow pine, aspen, and spruce belts. Newfoundland to Alaska, southward to Pennsylvania, Colorado, and Utah; also in Europe and Asia.

52. Carex buxbaumii Wahl. Svensk. Vet. Akad. Nya Handl. **24**: 163. 1803.

Spruce and alpine belts. Greenland to Alaska, southward to Georgia, Colorado, and California.

53. Carex raynoldsii Dewey, Amer. Journ. Sci. II. **32**: 39. 1861.

Spruce and alpine belts. Alberta to Washington, southward to Colorado and California.

54. Carex halleri Gunn. Fl. Norveg. **2**: 106. 1772.

Spruce and alpine belts. Greenland to Alaska, southward to Ontario and New Mexico; also in Europe and Asia.

55. Carex parryana Dewey, Amer. Journ. Sci. I. **27**: 239. 1835.

Plains, upward to the spruce belt. Hudson Bay to Alberta, southward to North Dakota and Colorado.

56. Carex bella Bailey, Bot. Gaz. **17**: 152. 1892.

Spruce and alpine belts. Colorado, New Mexico, Utah, and Arizona.

57. Carex epapillosa Mackenz.; Rydb. Fl. Rocky Mount. 138. 1917.

Spruce and alpine belts. Wyoming and Utah to California.

58. Carex chalciolepis Holm, Amer. Journ. Sci. IV. **16**: 28. 1903.

Spruce and alpine belts. Montana to Colorado, Arizona, and Nevada.

59. Carex atrata L. Sp. Pl. 976. 1753.

Alpine belt. Greenland to Alaska, southward to Wyoming; also in Europe and Asia.

60. Carex heteroneura W. Boott in Brew. & Wats. Bot. Calif. **2**: 240. 1880.

Spruce belt; Sierra Nevada. California and western Nevada.

61. Carex albonigra Mackenz.; Rydb. Fl. Rocky Mount. 137. 1917.

Alpine belt. Montana to Colorado, Utah, and Arizona.

62. Carex nova Bailey, Journ. Bot. Brit. & For. **26**: 322. 1888.

Spruce and alpine belts. Montana to New Mexico, Utah, and Idaho.

63. Carex viridula Michx. Fl. Bor. Amer. **2**: 170. 1803.

Plains, upward to the spruce belt. Newfoundland to British Columbia, southward to New Jersey, Colorado, and California.

64. Carex lanuginosa Michx. Fl. Bor. Amer. **2**: 175. 1803.

Plains, upward to the spruce belt. Nova Scotia to British Columbia, southward to Maryland, New Mexico, and California.

65. Carex atherodes Spreng. Syst. Veg. 3: 828. 1826.

In marshes, on plains, and upward to the yellow pine belt. New York to Missouri, westward to Colorado, Oregon, and Yukon.

66. Carex exsiccata Bailey, Mem. Torrey Club 1: 6. 1889.

Yellow pine, aspen, and spruce belts. Our specimen from Sevier Forest, Utah, has purplish perigynia. Montana to Alaska, southward to California.

67. Carex rostrata Stokes in With. Bot. Arr. Veg. Brit. ed. 2. 2: 1059. 1787.

Plains, upward to the spruce belt. Labrador to Alaska, southward to Delaware, New Mexico, and California.

18. LEMNACEAE. Duckweed Family

Small floating plants, propagating by proliferous growths from the parent plant or by seeds; plant body (thallus) disk-shaped, with a single root or a cluster of roots; flowers monoecious, arising from the margin of the disk, enclosed in a spathe, the staminate consisting of 1 or 2 stamens, the pistillate contiguous to the staminate; ovary 1 to 7-ovuled; fruit a utricle, 1 to 7-seeded.

Roots several; thallus distinctly ribbed_____1. SPIRODELA.
Roots solitary; thallus faintly ribbed_____2. LEMNA.

1. SPIRODELA Schleid. Duckweed

1. Spirodela polyrhiza (L.) Schleid. Linnaea 13: 392. 1839.

Lemna polyrhiza L. Sp. Pl. 970. 1753.

In ditches and pools of the Covillea and artemisia belts. Nova Scotia to British Columbia, southward to Florida, Mexico, and South America.

2. LEMNA L. Duckweed

Thallus stipitate, narrowly oblong, 4 to 10 mm long_____1. L. trisulca.
Thallus not stipitate, broader, 3 mm. long or less.
  Thallus gibbous, pale beneath_____2. L. gibba.
  Thallus not gibbous.
    Thallus indistinctly 3-nerved, round to oval, symmetric; spathe sack-like. 3. L. minor.
    Thallus indistinctly 1-nerved or nerveless, oblong to obovate-oblong, asymmetric; spathe open_____4. L. valdiviana.

1. Lemna trisulca L. Sp. Pl. 970. 1753.

In ponds and rivers on the plains, upward to the spruce belt. Nova Scotia to British Columbia, southward to New Jersey, Texas, and California; cosmopolitan.

2. Lemna gibba L. Sp. Pl. 970. 1753.

In ponds and rivers; Yellowstone Park. Nebraska to Texas, westward to California and Mexico; also in the Old World and Australia.

3. Lemna minor L. Sp. Pl. 970. 1753.

In rivers of the plains. Cosmopolitan.

4. Lemna valdiviana Phil. Linnaea 33: 239. 1864.

Lemna minor cyclostasa Ell. Bot. S. C. & Ga. 2: 518. 1824.

In pools and rivers. Massachusetts to California, southward to West Indies and South America.

19. COMMELINACEAE. Spiderwort Family

Perennial herbs with fibrous roots; stems jointed, mostly simple, leafy; leaves long, linear, sheathing at base; flowers in umbellate clusters, axillary and terminal, regular; perianth of 3 herbaceous sepals and 3 sessile, ovate to orbicular or obovate petals; stamens 6; ovary 3-celled, the cells 3-ovuled; style 1; stigma undivided; fruit a 2 or 3-celled capsule, the cells 1 or 2-seeded.

1. TRADESCANTIA L. Spiderwort

Sepals glabrous or nearly so ..... 1. T. scopulorum.
Sepals glandular-pubescent ..... 2. T. laramiensis.

1. Tradescantia scopulorum Rose, Contr. U. S. Nat. Herb. 5: 205. 1899.

Plains and hillsides of the artemisia and pinyon belts. Colorado, Utah, New Mexico, and Arizona.

2. Tradescantia laramiensis Goodding, Bot. Gaz. 33: 68. 1902.

Wet places on plains and hillsides of the artemisia and pinyon belts. Montana to Colorado and Utah.

20. JUNCACEAE. Rush Family

(Contributed by Frederick V. Coville)

Annual or perennial grasslike herbs; flowers perfect, regular, inconspicuous; sepals and petals each 3; stamens 3 or 6; ovary 1 or 3-celled; fruit a loculicidal capsule.

Leaf sheaths open; capsule 1 or 3-celled, many-seeded; placentas parietal or axial ..... 1. JUNCUS.
Leaf sheaths closed; capsule 1-celled, 3-seeded, its placenta basal. 2. JUNCOIDES.

1. JUNCUS L. Rush

Lowest leaf of the inflorescence terete, not conspicuously channeled, erect, appearing like a continuation of the stem, the inflorescence therefore appearing lateral. Stem leaves none.
Perianth parts with a chestnut-brown stripe down either side of the midrib, the margins hyaline. Inflorescence paniculate; stems 20 to 100 cm. high, from a thick creeping rootstock ..... 3. J. balticus.
Perianth parts green, or in age straw-colored.
Leaf of the inflorescence about equaling the stem or longer. Perennial. 10 to 60 cm. high, with slender (1 mm. thick) rootstock. 2. J. filiformis.

Leaf of the inflorescence much shorter than the stem.
Perianth 2 to 3 mm. long. Stamens 3; inflorescence many-flowered, 2 to 10 cm. high, in one form congested; tufted erect perennial, 40 to 130 cm. high; rootstock branching, proliferous. 1. J. effusus.

Perianth 4 to 7 mm. long.
Flowers numerous, in a more or less compound panicle; stout perennials with rootstocks. Sepals 5 to 6 mm. long.
Capsule apiculate; seeds acute ..... 4. J. mexicanus.
Capsule acute; seeds caudate ..... 5. J. cooperi.

Flowers 1 to 5, all but one pediceled; stems slender, 10 to 30 cm. high. Sheaths brown; capsules 3-angular.
Capsule acute, oblong. Sepals and petals linear-lanceolate, 5 to 7 mm. long ---- 6. J. parryi.
Capsule obtuse or retuse.
Capsule obtuse, oblong; sepals lanceolate, 7 mm. long. 7. J. drummondii.
Capsule retuse, ovate; sepals and petals broadly lanceolate, 4 to 5 mm. long ---- 8. J. hallii.
Lowest leaf of the inflorescence not appearing like a continuation of the stem or, if so, conspicuously channeled along the upper side, the inflorescence usually appearing terminal.
Leaf blades transversely flattened (inserted with the flat surface facing the stem), or terete or channeled, not provided with septa.
Flowers each in the axil of a bract and with two bractlets at the base of the perianth, inserted singly on the branches of the inflorescence, or sometimes congested, but not in true heads.
Plants annual, 2 to 30 cm. high, branching from the base. Leaf blades flat, 1 mm. broad or less; sepals lanceolate, acuminate.
Sepals 4 to 6 mm. long. Capsule oblong or ovoid, 3 to 4.5 mm. long. 9. J. bufonius.
Sepals 1.5 to 4 mm. long.
Flowers solitary; sepals 1.5 to 2 mm. long, with purplish midrib; plant 2 to 3 cm. high ---- 11. J. uncialis.
Flowers few to many; sepals 3 to 4 mm. long; capsule short-ovoid to subglobose, 2 to 3 mm. long; plant 5 to 20 cm. high. 10. J. sphaerocarpus.
Plants perennial.
Perianth segments deep purplish brown, with broad green midrib, obtuse; plants with running rootstocks ---- 12. J. gerardi.
Perianth segments pale greenish or yellowish green, acute or acuminate; plants densely tufted.
Auricles at top of leaf sheath cartilaginous, yellow when dry.
Sepals lanceolate, 5 mm. long, exceeding the ovoid capsule; plants 30 to 130 cm. high ---- 13. J. dudleyi.
Auricles at top of leaf sheath membranous, whitish or brownish.
Stems slender, 20 to 60 cm. high.
Sepals scarious to apex, 3.5 to 4 mm. long, exceeding the oblong capsule ---- 14. J. confusus.
Sepals not scarious at the aristate apex, 3 to 4.5 mm. long, the oval capsule three-fourths as long ---- 15. J. tenuis.
Flowers each in the axil of a bract but without bractlets, inserted in one or more true heads.
Junction of the leaf sheath and blade well marked, the auricles well developed; perianth segments smooth and usually shining. 17. J. longistylis.
Junction of the leaf sheath and blade inconspicuous, the auricles rudimentary or wanting; perianth segments minutely roughened on the back.
Seeds tailed ---- 16. J. regelii.
Seeds not tailed ---- 18. J. orthophyllus.
Leaf blades not transversely flattened, commonly terete, hollow, provided with septa.

Leaf blade usually channeled along the upper side; septa usually imperfect, not externally evident; inflorescence of 1 to 4 heads; plants of arctic or alpine range.

Heads 3 to 12-flowered; sepals brown or black, 4 to 7 mm. long, lanceolate; capsule one and one-half to two times as long as the sepals, oblong, tapering to an acute apex; seed tailed at both ends; stems 10 to 50 cm. high; leaves mostly basal_____19. J. castaneus.

Heads 1 to 5(usually 3)-flowered; sepals oblong-lanceolate, obtuse; capsule equaling the sepals, oblong, obtuse, mucronate; seed abruptly contracted into long slender tails; stems 8 to 16 cm. high.

20. J. triglumis.

Leaf blade not channeled along the upper side, the septa perfect and usually externally evident; inflorescence, except in depauperate specimens, of several to many heads; plants not of arctic or alpine range.

Leaves terete. Stamens 6 (3 in no. 22).

Capsule subulate-pointed.

Capsule much exceeding the perianth; heads 6 to 9 mm. in diameter; stems slender, 15 to 60 cm. high_____21. J. nodosus.

Capsule about equaling the perianth; heads 10 to 16 mm. in diameter, mostly clustered; stems stout, 30 to 90 cm. high.

22. J. torreyi.

Capsule obtuse, acute, or mucronate.

Capsule much exceeding the perianth. Stems about 30 cm. high.

23. J. tweedyi.

Capsule shorter than the perianth.

Capsule long-mucronate. Stems slender, 20 to 40 cm. high; heads blackish brown_____24. J. nevadensis.

Capsule merely apiculate.

Heads solitary (rarely 2 or 3), blackish brown. Stems slender, 10 to 30 cm. high_____25. J. mertensianus.

Heads several or numerous.

Perianth 2 to 3 mm. long; stems slender, 30 to 50 cm. high.

Heads brown_____26. J. badius.

Perianth 3.5 to 4.5 mm. long; stems stoutish, 30 to 60 cm. high. Heads numerous_____27. J. suksdorfii.

Leaves flat, equitant. Plants 20 to 60 cm. high.

Heads 5 to 12-flowered, usually numerous.

Plant stout; heads greenish or light brown_____28. J. xiphioides.

Plant slender; heads deep brown_____29. J. brunnescens.

Heads 15 to 25-flowered, solitary or few.

Heads light brown_____30. J. parous.

Heads very dark brown.

Stamens 6; ligules usually auriculate_____31. J. saximontanus.

Stamens 3; ligules not auriculate_____32. J. ensifolius.

1. Juncus effusus L. Sp. Pl. 326. 1753.

Swamps and moist places; Kaweah River, southeastern California. Nearly throughout North America, except the arid and high northern portions; possibly not within the limits of the Great Basin.

2. Juncus filiformis L. Sp. Pl. 326. 1753.

Wet places of the spruce belt; Uintah Mountains, Utah. Greenland to Pennsylvania, Colorado, Utah, and Washington; also in Alaska, Europe, and Asia.

3. Juncus balticus Willd. Ges. Naturf. Freund. Berlin Mag. 3: 298. 1809.

Wet places throughout the Great Basin, at 1,500 to 3,300 meters. Alaska to Pennsylvania, New Mexico, and California; also in Europe.

4. Juncus mexicanus Willd.; Roem. & Schult. Syst. Veg. 7: 178. 1829.

Wet places of the Covillea and artemisia belts, upward to 1,200 meters. New Mexico to Nevada and California, southward to Mexico.

5. Juncus cooperi Engelm. Trans. Acad. St. Louis 2: 590. 1868.

Margins of salt marshes and in saline meadows. Southern Utah to California.

6. Juncus parryi Engelm. Trans. Acad. St. Louis 2: 446. 1866.

Spruce and alpine belts. Montana to British Columbia, southward to Colorado and California.

7. Juncus drummondii E. Mey.; Ledeb. Fl. Ross. 4: 235. 1853.

Spruce and alpine belts. Alaska to California and Colorado.

8. Juncus hallii Engelm. Trans. Acad. St. Louis 2: 446. 1866.

Spruce and alpine belts. Montana to Colorado and Utah.

9. Juncus bufonius L. Sp. Pl. 328. 1753.

Waste places, meadows, along creeks, and in canyons, upward to 2,700 meters. North America except in the extreme north; also in Europe and Asia.

10. Juncus sphaerocarpus Nees; Funk, Flora 1: 521. 1818.

Gravelly soil along margins of pools and lakes. Oregon to California, eastward to Idaho and Colorado.

11. Juncus uncialis Greene, Pittonia 2: 105. 1890.

Spruce belt. California to Nevada.

12. Juncus gerardi Lois. Journ. de Bot. Desv. 2: 284. 1809.

Introduced and established in salt marshes near Salt Lake City, Utah. Gulf of St. Lawrence to Florida; rarely inland to western New York and the Great Lakes, also on the northwest coast, and in Europe.

13. Juncus dudleyi Wiegand, Bull. Torrey Club 27: 524. 1900.

Plains, canyons, and mountain meadows, upward to 2,500 meters. Maine to Washington, southward to New York, New Mexico, and Arizona.

14. Juncus confusus Coville, Proc. Biol. Soc. Washington 10: 127. 1896.

Plains, canyons, and mountain meadows, upward to 3,000 meters. Saskatchewan to British Columbia, southward to Nebraska and New Mexico.

15. Juncus tenuis Willd. Sp. Pl. 2: 214. 1799.

Plains, canyons, and mountain sides, upward to 2,500 meters. Nearly throughout North America.

16. Juncus regelii Buch. Bot. Jahrb. Engler 12: 414. 1890.

Spruce and alpine belts. Washington and Idaho to Utah.

17. Juncus longistylis Torr. U. S. & Mex. Bound. Bot. 223. 1859.

Plains, canyons, and mountain sides, upward to 2,500 meters. South Dakota to Alberta, southward to New Mexico and California.

18. Juncus orthophyllus Coville, Contr. U. S. Nat. Herb. 4: 207. 1893.

Plains and mountain sides, upward to 2,500 meters. Washington to California and Utah.

19. Juncus castaneus J. E. Smith, Fl. Brit. 1: 383. 1800.

Spruce and alpine belts. Newfoundland to Alaska, southward to Colorado.

20. Juncus triglumis L. Sp. Pl. 328. 1753.

Alpine belt. Labrador to Alaska, southward to Colorado and northern Utah.

21. Juncus nodosus L. Sp. Pl. ed. 2. 466. 1762.

Alkaline meadows and wet places of the Covillea and artemisia belts. Nova Scotia to British Columbia, southward to Virginia and Nevada.

22. Juncus torreyi Coville, Bull. Torrey Club 22: 303. 1895.

Wet places and near creeks of the Covillea, artemisia, and pinyon belts. Massachusetts to Ontario and Washington, southward to New York, Texas, and California.

23. Juncus tweedyi Rydb. Mem. N. Y. Bot. Gard. 1: 90. 1900.

In bogs and about springs of aspen and spruce belts. Montana to Wyoming and Utah.

24. Juncus nevadensis S. Wats. Proc. Amer. Acad. 14: 303. 1879.

Meadows and wet places of the artemisia belt, upward to the spruce belt. British Columbia to Montana, Nevada, and California.

25. Juncus mertensianus Bong. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 167. 1832.

Aspen, spruce, and alpine belts. Alaska to California and New Mexico.

26. Juncus badius Suksdorf, Deutsch. Bot. Monatsschr. 19: 92. 1901.

Juncus truncatus Rydb. Bull. Torrey Club 31: 399. 1904.

Aspen and spruce belts. Washington to Wyoming and northern New Mexico.

27. Juncus suksdorfii Rydb. Bull. Torrey Club 26: 541. 1899.

Wet meadows of the artemisia belt; Camas Prairie. Idaho to Washington and Oregon.

28. Juncus xiphioides E. Meyer, Syn. Junc. 50. 1822.

Wet places, valleys, and canyons, upward to 2,500 meters. Southern California and Nevada to New Mexico and Mexico.

29. Juncus brunnescens Rydb. Bull. Torrey Club 31: 400. 1904.

Wet places of the artemisia, pinyon, and yellow pine belts. Colorado and Utah to Arizona.

30. Juncus parous Rydb. Bull. Torrey Club 31: 401. 1904.

Juncus tracyi Rydb. Fl. Rocky Mount. 155, 1061. 1917.

Meadows of the pinyon belt. Utah, Nevada, and Idaho.

31. Juncus saximontanus A. Nels. Bull. Torrey Club 29: 401. 1902.

Juncus xiphioides montanus Engelm. Trans. Acad. St. Louis 2: 481, in part. 1868.

Wet places of the aspen and spruce belts. Alberta and British Columbia, southward to New Mexico and California.

32. Juncus ensifolius Wikstr. Svensk. Vet. Akad. Handl. 2: 274. 1823.

Pinyon and aspen belts. Alberta to Alaska, southward to Utah and California.

2. JUNCOIDES Adans. Woodrush

Flowers crowded in heads or spikelike clusters; plants 10 to 40 cm. high. Leaves 3 to 15 cm. long, 2 to 5 mm. broad.

Flower clusters in a simple or compound spike_____1. J. spicatum.

Flower clusters pedunculate, forming a corymbose inflorescence. **2. J. campestre.**

Flowers solitary at the tips of the inflorescence, forming a loose panicle; plants 20 to 50 cm. high.

Perianth 3 to 3.5 mm. long. Plants strongly stoloniferous; leaves 6 to 10 mm. broad **3. J. glabratum.**

Perianth 2 mm. long or less.

Leaves 3 to 6 mm. wide; ultimate pedicels 6 to 15 mm. long. **4. J. divaricatum.**

Leaves 7 to 15 mm. wide; ultimate pedicels 5 mm. long or less. **5. J. parviflorum.**

1. **Juncoides spicatum** (L.) Kuntze, Rev. Gen. Pl. **2**: 725. 1891.
Juncus spicatus L. Sp. Pl. 330. 1753.
Luzula spicata DC. & Lam. Fl. Franc. **3**: 161. 1805.
Spruce and alpine belts. Labrador to Alaska, southward to New York, Colorado, and California; also in Europe and Asia.

2. **Juncoides campestre** (L.) Kuntze, Rev. Gen. Pl. **2**: 722. 1891.
Juncus campestris L. Sp. Pl. 329. 1753.
Aspen and spruce belts. Montana to Colorado, westward to Alaska and California.

3. **Juncoides glabratum** (Hoppe) Sheld. Bull. Geol. & Nat. Hist. Surv. Minn. **9**: 145. 1894.
Juncus glabratus Hoppe; Rostk. Monogr. Junc. 27. 1801.
Luzula glabrata Desv. Journ. de Bot. Desv. **1**: 145. 1808.
Spruce and alpine belts. Montana to Idaho, Nevada (?), Washington, and Alaska; also in Europe.

4. **Juncoides divaricatum** (S. Wats.) Coville, Contr. U. S. Nat. Herb. **4**: 209. 1893.
Luzula divaricata S. Wats. Proc. Amer. Acad. **14**: 302. 1879.
Spruce and alpine belts. California and Nevada.

5. **Juncoides parviflorum** (Ehrh.) Coville, Contr. U. S. Nat. Herb. **4**: 209. 1893.
Juncus parviflorus Ehrh. Beitr. Naturk. **6**: 139. 1791.
Luzula parviflora Desv. Journ. de Bot. Desv. **1**: 144. 1808.
Spruce and alpine belts. Labrador to Alaska, southward to New York, Minnesota, Arizona, and California.

21. LILIACEAE. Lily Family

Perennial herbs, shrubs, or trees, from bulbs, corms, or rootstocks; flowers regular, 6-merous; stamens 6, inserted opposite the perianth lobes, the anthers 2-celled; ovary mostly superior, 3-celled, ovules numerous; styles 3, often united or wanting; fruit a berry or a 3-celled many-seeded capsule.

Stems much branched, from thick matted rootstocks; branchlets filiform, leaflike, clustered in the axils of scales (leaves). Flowers greenish yellow, on jointed pedicels; fruit a berry **20. ASPARAGUS.**

Stems simple or branched; branchlets not leaflike or clustered.

Plants acaulescent or arborescent shrubs or trees. Leaves linear or linear-lanceolate, pungent; flowers in large panicles; perianth greenish white, the segments 4 to 7 cm. long; fruit a 3-celled loculicidal capsule, or berry-like.

Plants shrubs or small trees; leaves filiferous; style evident. **18. YUCCA.**

Plants trees, 5 to 10 meters high; leaves not filiferous, 10 to 20 cm. long; style wanting. Capsule ovoid, 5 to 10 cm. long.

19. CLISTOYUCCA.

Plants perennial herbs.

Plants scapose or nearly so.

Flowers umbellate, or subumbellate and nearly sessile, or subcapitate.

Perianth tube 3 to 8 cm. long, the lobes white, linear-oblong; style filiform. Leaves linear, surrounded by scarious sheaths; capsule obovoid; low plants with a rootstock and fibrous roots.

6. LEUCOCRINUM.

Perianth 2 cm. long or less; styles united. Fruit a capsule; umbels subtended by a scarious involucre; plants with fibrous-coated bulbs.

Perianth of nearly distinct segments.

Bracts subtending the umbel spathaceous, more or less connate; perianth segments 1-nerved 8. ALLIUM.

Bracts subtending the umbel several, distinct; perianth 6-parted, greenish white, 8 to 10 mm. long. the segments 2 to 3-nerved. Capsule globose; plant 10 to 20 cm. high; leaves narrowly linear, exceeding the scape 9. MUILLA.

Perianth segments united below the middle.

Filaments free; flowers subcapitate or umbellate.

10. HOOKERA.

Filaments united into a tube; flowers umbellate, blue or rose-colored. Style filiform; capsule subglobose.

11. ANDROSTEPHIUM.

Flowers solitary or racemose.

Leaves 2, oval to ovate-lanceolate. Flower yellow, the segments lanceolate, acuminate, nearly free; capsule obovate, 2 to 4 cm. long.

14. ERYTHRONIUM.

Leaves 2 or more, linear.

Perianth 2 to 3 cm. long, blue, white, or purple, the segments distinct, linear-spatulate. Capsule triangular-ovate, 15 to 20 mm. long.

17. QUAMASIA.

Perianth 12 mm. long or less, white or yellow. Flowers subtended by scarious bracts.

Perianth whitish, the segments oblong, 5 to 6 mm. long; capsule ovoid, 5 mm. long; plants 15 to 60 cm. high, viscid-pubescent.

1. TOFIELDIA.

Perianth 8 to 12 mm. long, the segments distinct, each with 3 green ribs; capsule ovate, 5 to 7 mm. long; plants 15 to 30 cm. high 5. EREMOCRINUM.

Plants with leafy stems.

Plants 1 to 2 meters high. Leaves 20 to 30 cm. long, oval, sessile or sheathing, pubescent; flowers white, in large panicles, the perianth segments 8 to 10 mm. long, 5 to 7-nerved; capsule ovoid.

4. VERATRUM.

Plants mostly 1 meter high or less, with leaves 15 cm. long or less.

Leaves 3, verticillate, rhombic-acuminate, 7 to 12 cm. long. Flowers solitary, the sepals green, the petals pink, purple, or white; fruit a 3 or 4-celled berry 25. TRILLIUM.

Leaves alternate or opposite, if whorled with more than 3 leaves in a whorl, and in 1 to 3 whorls.

Perianth segments united into a distinct tube below.
Perianth 4 to 6 cm. long, funnelform, white, the segments narrowly spatulate; desert plant 30 cm. high or more; leaves linear, clasping; flowers racemose; capsule subglobose. **7. HESPEROCALLIS.**
Perianth 1 to 2 cm. long, white, tubular; woodland plant 30 cm. to 1.5 meter high; leaves ovate or oblong, clasping, 5 to 15 cm. long; flowers in axillary clusters; fruit a subglobose berry **24. POLYGONATUM.**
Perianth segments distinct or nearly so, 8 cm. long or less.
Leaves linear.
Perianth of dissimilar segments. Stigmas sessile, recurved; capsule 3-angled or 3-winged **16. CALOCHORTUS.**
Perianth segments similar or nearly so.
Inflorescence 30 to 40 cm. long, dense. Flowers white, not bracted; capsule ovoid, free; leaves 50 cm. long or more, rigid, the upper ones reduced **2. XEROPHYLLUM.**
Inflorescence loosely racemose or paniculate or flowers solitary.
Flowers white with purple veins, not bracted, solitary, 1 cm. long. Capsule obovoid; plants 5 to 15 cm. high, with bulbs and slender stems **15. LLOYDIA.**
Flowers yellowish, yellow, or purple.
Flowers racemose or paniculate, bracted, 1 cm. long or less, yellowish; capsule ovoid **3. ZYGADENUS.**
Flowers solitary or few, yellow or purple, nodding; capsule 6-angled, cylindric. Plants with scaly bulbs. **13. FRITILLARIA.**
Leaves linear-lanceolate to oval.
Flowers axillary or extra-axillary. Peduncle bent or twisted near the middle; perianth segments greenish white, recurved; fruit a berry; leaves ovate-acuminate, clasping. **23. STREPTOPUS.**
Flowers in terminal racemes, corymbs, panicles, or fascicles (solitary or subumbellate in no. 21).
Perianth of dissimilar segments. Stigmas sessile, recurved; ovary triquetrous; capsule 3-angled or 3-winged; stems from membranous-coated corms **16. CALOCHORTUS.**
Perianth segments similar or nearly so.
Flowers ochroleucous or white, 15 mm. long or less. Plants with rootstocks; fruit a berry.
Stem simple **21. VAGNERA.**
Stem branched. Leaves ovate to ovate-lanceolate, sessile, pubescent to glabrate; berry red or orange. **22. DISPORUM.**
Flowers yellow, orange and purple-spotted, or purple. Bulb scaly; leaves alternate or whorled.
Anthers versatile; perianth segments 2.5 to 8 cm. long, recurved, orange with purple dots **12. LILIUM.**
Anthers basifixed; perianth segments 0.5 to 3 cm. long, not recurved **13. FRITILLARIA.**

1. TOFIELDIA Huds. Bog-asphodel

1. Tofieldia intermedia Rydb. Bull. Torrey Club 27: 528. 1900.
In bogs about Lake Tahoe. Alaska to Wyoming and California.

2. XEROPHYLLUM L. Rich.

1. Xerophyllum tenax (Pursh) Nutt. Gen. Pl. 1: 235. 1818. BEARGRASS.

Helonias tenax Pursh, Fl. Amer. Sept. 1: 243. 1814.

Plains and foothills; southern Oregon. Montana to British Columbia, southward to northern Nevada and California.

3. ZYGADENUS Michx. DEATHCAMAS

Perianth segments about 5 mm. long, more or less distinctly clawed. Plants 30 to 60 cm. high; capsule 12 to 15 mm. long.

Upper leaves, like the lower, with sheaths; perianth segments ovate; inflorescence paniculate, often racemose above_____1. Z. paniculatus.

Upper leaves without distinct sheaths; perianth segments ovate to elliptic-ovate; inflorescence racemose_____2. Z. venenosus.

Perianth segments 7 to 8 mm. long.

Flowers racemose, erect; stamens included; capsule ovoid; plants 30 to 60 cm. high_____3. Z. elegans.

Flowers paniculate, drooping; inflorescence 30 cm. long or less; stamens exserted; plants 70 to 100 cm. high_____4. Z. volcanicus.

1. Zygadenus paniculatus S. Wats. in King, Geol. Expl. 40th Par. 5: 343. 1871.

FOOTHILL DEATHCAMAS.

Plains, foothills, and lower canyons of the artemisia and pinyon belts. Montana to New Mexico, westward to California.

2. Zygadenus venenosus S. Wats. Proc. Amer. Acad. 14: 279. 1879.

MEADOW DEATHCAMAS.

Plains and foothills of the artemisia and pinyon belts. Montana to Utah, westward to California.

3. Zygadenus elegans Pursh, Fl. Amer. Sept. 1: 241. 1814.

MOUNTAIN DEATHCAMAS.

Anticlea coloradensis Rydb. Bull. Torrey Club 30: 273. 1903.

Aspen and spruce belts. Saskatchewan to New Mexico, Nevada, and Alaska.

4. Zygadenus volcanicus Benth. Pl. Hartw. 96. 1840.

Anticlea vaginata Rydb. Bull. Torrey Club 39: 108. 1912.

Dry canyons, upward to 1,800 meters. Southeastern Utah, southward to Mexico.

4. VERATRUM L. FALSE-HELLEBORE

1. Veratrum californicum Durand, Journ. Acad. Phila. 3: 103. 1854.

Veratrum speciosum Rydb. Bull. Torrey Club 27: 531. 1900.

Aspen and spruce belts. Washington to Montana, southward to California and New Mexico. This species is known as skunk-cabbage in the Rocky Mountain and Great Basin States.

5. EREMOCRINUM Jones

1. Eremocrinum albomarginatum Jones, Zoe 4: 53. 1893.

Hesperanthes albomarginata Jones, Zoe 2: 251. 1891.

Desert areas and dry hillsides of the artemisia belt. Utah.

6. LEUCOCRINUM Nutt. SAGELILY

1. Leucocrinum montanum Nutt.; A. Gray, Ann. Lyc. N. Y. 4: 110. 1848.

Plains and dry hillsides of the artemisia belt. South Dakota to New Mexico, westward to Oregon and California.

7. HESPEROCALLIS A. Gray

1. Hesperocallis undulata A. Gray, Proc. Amer. Acad. 7: 391. 1868.

Desert areas of the Covillea belt; Fort Mohave, Arizona. Arizona to southern California and Lower California. The bulbs are eaten by the Indians.

8. ALLIUM L. Onion

Scapes compressed or 2-edged.

Scapes 30 cm. high or more, the bulb rhizomatous. Leaves 1 cm. broad or more; bracts 2 to 4; perianth segments 7 to 8 mm. long, acuminate, dark rose-colored; capsule subglobose, not crested____2. A. validum.

Scapes 20 cm. high or less, the bulbs not rhizomatous. Perianth segments 8 to 14 mm. long, acuminate.

Leaves 10 mm. broad or more; capsule not crested. Flowers rose-colored. 5. A. platycaule.

Leaves 2 to 8 mm. broad; capsule 6-crested.

Flowers pink to nearly white, with purplish midribs, the segments 6 to 8 mm. long, acuminate; leaves 2.

Flowers in the umbel 20 or fewer_____6. A. anceps.

Flowers in the umbel 30 to 60_____7. A. tolmiei.

Flowers reddish purple, the segments 10 to 12 mm. long, acuminate; leaves solitary_____11. A. atrorubens.

Scapes terete or nearly so.

Leaves terete and hollow. Flowers subcapitate, rose-colored, the segments 10 mm. long, acuminate; capsule not crested; bulb rhizomatous; scapes 30 to 60 cm. high_____1. A. sibiricum.

Leaves flat or channeled.

Stamens and style exserted. Capsule 6-crested; bulb rhizomatous; scapes 10 to 60 cm. high; umbels nodding_____4. A. cernuum.

Stamens and style included. Bulbs not rhizomatous, except in no. 3.

Outer bulb coat more or less fibrous-reticulate. Perianth segments acuminate.

Perianth segments 8 to 10 mm. long; capsule not crested. Bulb rhizomatous_____3. A. brevistylum.

Perianth segments 4 to 8 mm. long; capsule crested. Leaves 2 to 4 mm. broad.

Scape 10 to 30 cm. high; perianth segments 4 to 6 mm. long; capsule with small rounded crests_____18. A. textile.

Scape 30 to 60 cm. high; perianth segments 6 to 8 mm. long; capsule prominently crested_____17. A. geyeri.

Outer bulb coat not fibrous-reticulate.

Perianth segments obtuse or acutish, 6 to 8 mm. long, pinkish. Leaves 2 or more; capsule not crested.

Perianth segments broad, obtuse_____8. A. parvum.

Perianth segments oblong-lanceolate, acutish__13. A. tribracteatum.

Perianth segments acuminate.

Perianth segments serrulate, reddish purple, 8 to 12 mm. long. Crests of ovary obsolete; plants 10 to 20 cm. high. 19. A. acuminatum.

Perianth segments entire.

Perianth segments not gibbous at base, dark red to white. Capsule not evidently crested; scapes 5 to 7 cm. high__14. A. diehlii.

Perianth segments gibbous at base.
Capsules not crested. Scape 10 cm. high or less; perianth segments rose-colored, 6 to 8 mm. long____9. A. brandegei.
Capsules more or less distinctly 6-crested.
Leaf 1, exceeding the scape.
Perianth segments 10 mm. long, twice as long as the stamens. 12. A. cristatum.
Perianth segments 6 to 8 mm. long, slightly exceeding the stamens_____15. A. nevadense.
Leaves 2 or more (?). Perianth segments 6 to 8 mm. long; scapes 10 to 30 cm. high.
Filaments filiform; flowers deep rose-colored to white. 10. A. campanulatum.
Filaments more or less dilated; flowers light rose-colored. 16. A. bisceptrum.

1. **Allium sibiricum** L. Mant. Pl. 562. 1771.

Meadows and gravelly banks of the spruce belt; Utah. New Brunswick to Alaska, southward to New England, Colorado and Oregon; also in Asia.

2. **Allium validum** S. Wats. in King, Geol. Expl. 40th Par. 5: 350. 1871.

Plains and mountain sides, upward to the spruce belt. Oregon, California, and Nevada.

3. **Allium brevistylum** S. Wats. in King, Geol. Expl. 40th Par. 5: 350. 1871.

Yellow pine, aspen, and spruce belts. Montana to Colorado and Utah.

4. **Allium cernuum** Roth, Archiv Bot. Roemer 1²: 40. 1798.
Allium recurvatum Rydb. Mem. N. Y. Bot. Gard. 1: 94. 1900.

Meadows of the artemisia, pinyon, and yellow pine belts. New York to British Columbia, southward to New Mexico and Arizona.

5. **Allium platycaule** S. Wats. Proc. Amer. Acad. 14: 234. 1879.

Hillsides and rocky ridges of the artemisia and yellow pine belts. California and western Nevada.

6. **Allium anceps** Kellogg, Proc. Calif. Acad. 2: 109. *f.* 32. 1863.

Plains and dry hillsides; eastern base of the Sierra Nevada. Nevada and Oregon.

7. **Allium tolmiei** Baker in Curtis's Bot. Mag. sub *pl.* 6227. 1876.

Plains and hillsides of the artemisia and yellow pine belts. Washington to Utah.

8. **Allium parvum** Kellogg, Proc. Calif. Acad. 3: 54. *f.* 13. 1863.
Allium tribracteatum andersoni S. Wats. in King, Geol. Expl. 40th Par. 5: 353. 1871.

Valleys and dry ridges of the artemisia belt. Nevada.

9. **Allium brandegei** S. Wats. Proc. Amer. Acad. 17: 380. 1882.

Yellow pine, aspen, and spruce belts. Colorado and Utah to Oregon.

10. **Allium campanulatum** S. Wats. Proc. Amer. Acad. 14: 231. 1879.

Yellow pine and aspen belts; Sierra Nevada. Oregon, California, and western Nevada.

11. **Allium atrorubens** S. Wats. in King, Geol. Expl. 40th Par. 5: 352. *pl.* 38, *f.* 4, 5. 1871.

Plains and hillsides of the artemisia and pinyon belts. Nevada.

12. Allium cristatum S. Wats. Proc. Amer. Acad. **14**: 232. 1879.

Covillea belt. Utah and Arizona.

13. Allium tribracteatum Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 148. 1857.

Dry rocky slopes of the artemisia and yellow pine belts. Oregon, California, and Nevada.

14. Allium diehlii Jones, Contr. West. Bot. **10**: 86. 1902.

Aspen and spruce belts. Utah.

15. Allium nevadense S. Wats. in King, Geol. Expl. 40th Par. **5**: 351. 1871.

Plains and hillsides of the Covillea and artemisia belts. Utah, Arizona, and Nevada.

16. Allium bisceptrum S. Wats. in King, Geol. Expl. 40th Par. **5**: 351. *pl. 37, f. 1–2.* 1871.

Allium palmeri S. Wats. in King, Geol. Expl. 40th Par. **5**: 487. 1871.

Plains and hillsides of the Covillea, artemisia, and pinyon belts. Utah to New Mexico, westward to California.

17. Allium geyeri S. Wats. Proc. Amer. Acad. **14**: 227. 1879.

Allium reticulatum deserticola Jones, Contr. West. Bot. **10**: 30. 1902.

Wet canyons and mountain parks of the yellow pine, aspen, and spruce belts. South Dakota to Washington, southward to New Mexico and Arizona.

18. Allium textile Nels. & Macbr. Bot. Gaz. **56**: 470. 1913.

Allium reticulatum Fraser; G. Don, Mem. Wern. Soc. **6**: 36. 1827. Not Presl, 1819.

Plains and dry hillsides of the artemisia, pinyon, and yellow pine belts. Saskatchewan and Alberta, southward to New Mexico and Arizona.

19. Allium acuminatum Hook. Fl. Bor. Amer. **2**: 184. *pl. 196.* 1839.

Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. British Columbia to California, Arizona and Colorado.

9. MUILLA S. Wats.

1. Muilla transmontana Greene, Pittonia **1**: 73. 1887.

Plains and foothills; Reno, Nevada.

10. HOOKERA Salisb. CLUSTERLILY

Anthers basifixed. Flowers generally subcapitate; filaments subulate; capsule ovoid.

- Bracts ovate to lanceolate, exceeding the pedicels, violet-purple; perianth funnelform, 15 mm. long ..... **1. H. capitata.**
- Bracts lanceolate, often exceeded by the unequal pedicels, white with lilac veins; perianth cylindro-campanulate, abruptly widening into the limb, 12 mm. long ..... **2. H. pauciflora.**

Anthers versatile.

- Perianth purple, 2 cm. long, campanulate; scapes 30 to 60 cm. high; bracts lanceolate; stamens apparently in two series; capsule ellipsoid, stipitate ..... **3. H. douglasii.**

Perianth white or yellowish, with purplish veins, campanulate; scapes 7 to 60 cm. high; stamens in one row; capsules stipitate.

- Perianth yellow, 20 mm. long; filaments dilated, 3-cuspidate; capsule ovate-oblong, short-beaked ..... **4. H. ixioides.**
- Perianth white, 10 to 14 mm. long; filaments with broad triangular bases; capsules subglobose, abruptly beaked ..... **5. H. hyacinthina.**

1. Hookera capitata (Benth.) Kuntze, Rev. Gen. Pl. **2**: 712. 1891.
Brodiaea capitata Benth. Pl. Hartw. 339. 1857.
Canyons and hillsides of the artemisia and pinyon belts; Panamint Mountains, California. Oregon and California, eastward to southern Utah (?).

2. Hookera pauciflora (Torr.) Tidestrom.
Brodiaea capitata pauciflora Torr. U. S. & Mex. Bound. Bot. 218. 1859.
Plains and hillsides of the Covillea belt. New Mexico to southern Utah and southern California.

3. Hookera douglasii (S. Wats.) Piper, Contr. U. S. Nat. Herb. **11**: 190. 1906.
Brodiaea douglasii S. Wats. Proc. Amer. Acad. **14**: 237. 1879.
Plains and foothills of the artemisia and pinyon belts. Montana to British Columbia, southward to Utah and Oregon.

4. Hookera ixioides (Ait. f.) Kuntze, Rev. Gen. Pl. **2**: 712. 1891.
Ornithogalum ixioides Ait. f. Hort. Kew. ed. 2. **2**: 257. 1811.
Canyons and mountain sides, upward to 2,700 meters; Sierra Nevada. California and western Nevada.

5. Hookera hyacinthina (Lindl.) Kuntze, Rev. Gen. Pl. **2**: 712. 1891.
Hesperoscordum hyacinthinum Lindl. Bot. Reg. **15**: sub. *pl. 1293*. 1829.
Hesperoscordum lacteum Lindl. Bot. Reg. **19**: *pl. 1639*. 1833.
Meadows and dry hillsides of the artemisia and yellow pine belts. Idaho and British Columbia, southward to Nevada and California.

11. ANDROSTEPHIUM Torr.

1. Androstephium breviflorum S. Wats. Amer. Nat. **7**: 303. 1873.
Plains and hillsides of the Covillea and artemisia belts. Western Colorado to southern California.

12. LILIUM L. Lily

Perianth segments 2.5 to 3 cm. long, oblanceolate; anthers broadly oblong, 5 mm. long. Capsule subspheric; plants 50 cm. to 2 meters high, with linear-oblanceolate to oblong-oblanceolate leaves 4 to 13 cm. long. **1. L. parvum.**

Perianth segments 5 to 8 cm. long; anthers oblong, 7 to 8 mm. long.
- Perianth segments oval, acute or acuminate; capsule cylindric, acute-angled, 6 cm. long; leaves mostly alternate, linear to lanceolate; plants 30 to 60 cm. high ..... **2. L. umbellatum.**
- Perianth segments lanceolate, acute or acuminate; capsule cylindric-oblong, 3 cm. long; leaves in 3 or 4 whorls, alternate above and below, narrowly lanceolate; plants 0.8 to 2 meters high ..... **3. L. pardalinum.**

1. Lilium parvum Kellogg, Proc. Calif. Acad. **2**: 179. *f. 12*. 1863.
Mountain meadows and canyons of the aspen and spruce belts; Sierra Nevada. Oregon, California, and western Nevada.

2. Lilium umbellatum Pursh, Fl. Amer. Sept. **1**: 229. 1814.
Lilium montanum A. Nels. Bull. Torrey Club **26**: 6. 1899.
Aspen and spruce belts; western Colorado. Michigan to Saskatchewan, southward to New Mexico and Arizona.

3. Lilium pardalinum Kellogg, Proc. Calif. Acad. **2**: 12. 1863.
Canyons of Sierra Nevada, upward to 2,700 meters; Big Pine, California. California and western Nevada (?).

13. FRITILLARIA L. Fritillary

Flowers yellow or orange, 12 to 20 mm. long, solitary, nodding. Capsule obovoid, 3 to 4 cm. long; plants 10 to 30 cm. high with linear subverticillate leaves 3 to 8 cm. long----------1. F. pudica.
Flowers scarlet to dark purple.
Perianth 5 to 25 mm. long, dark purple, spotted with yellow, the segments elliptic to linear; capsule 15 mm. long, as long as broad; plants 10 to 40 cm. high, with linear leaves----------2. F. atropurpurea.
Perianth 25 to 30 mm. long, scarlet, spotted with reddish purple, the segments narrowly oblanceolate, recurved; plants 18 to 48 cm. high, with linear-lanceolate, mostly whorled leaves----------3. F. recurva.

1. **Fritillaria pudica** (Pursh) Spreng. Syst. Veg. 2: 64. 1825.
Lilium pudicum Pursh, Fl. Amer. Sept. 1: 228. *pl.* 8. 1814.
Pinyon, yellow pine, and aspen belts. British Columbia to Montana, Utah, and California.

2. **Fritillaria atropurpurea** Nutt. Journ. Acad. Phila. 7: 54. 1834.
Plains, canyons, and mountain sides, upward to 3,000 meters. North Dakota to New Mexico, westward to Oregon and California.

3. **Fritillaria recurva** Benth. Pl. Hartw. 340. 1857.
Yellow pine and aspen belts; near Lake Tahoe. Oregon, California, and western Nevada.

14. ERYTHRONIUM L. Trout Lily

1. **Erythronium parviflorum** (S. Wats.) Goodding, Bot. Gaz. 33: 67. 1902.
Erythronium grandiflorum S. Wats. in King, Geol. Expl. 40th Par. 5: 348, in part. 1871. Not *E. grandiflorum* Pursh, 1814.
Erythronium grandiflorum parviflorum S. Wats. Proc. Amer. Acad. 26: 129. 1891.
Erythronium utahense Rydb. Fl. Rocky Mount. 165, 1061. 1917.
Spruce belt. British Columbia to Wyoming, Utah, and Colorado.

15. LLOYDIA Salisb. Craglily

1. **Lloydia serotina** (L.) Sweet, Hort. Brit. ed. 2. 527. 1830.
Anthericum serotinum L. Sp. Pl. ed. 2. 444. 1762.
Lloydia alpina Salisb. Trans. Hort. Soc. Lond. 1: 328. 1812.
Alpine belt. Arctic regions, southward to New Mexico and Nevada; Europe and Asia.

16. CALOCHORTUS Pursh. Mariposa

Flowers bright yellow or red-orange. Petals broadly cuneate, 3 to 4 cm. long.
Petals bright yellow, with a densely hairy gland at base and a purplish lunate spot above; capsule narrowly oblong, about 4 cm. long. 5. C. aureus.
Petals red or scarlet-orange, with a hairy gland and a deep purple cuneate base; capsule 3 to 4 cm. long----------4. C. kennedyi.
Flowers cream-colored, tinged with purple, lilac, white, or blue.
Petals commonly 15 mm. long. or less, obovate, rounded or acute.
Petals not hairy within, white or pale lilac----------1. C. nudus.
Petals hairy within, greenish white, with purplish base----2. C. elegans.
Petals 20 mm. long or more, obovate. Capsule not winged, except in no. 3.
Anthers acute, the gland broader than long. Plants 20 to 50 cm. high. 8. C. gunnisonii.

Anthers obtuse.
Petals abruptly acuminate, the glands oblong.
Petals cream-colored, tinged with purple, 3 cm. long.
6. C. acuminatus.
Petals light blue, lilac, or purplish, 4 cm. long____7. C. macrocarpus.
Petals rounded or merely acute, the glands not broader than long.
Stem flexuous. Gland orbicular_____10. C. flexuosus.
Stem strict.
Purple spot at perianth segments orbicular; capsule winged.
3. C. eurycarpus.
Purple spot of perianth segments lunate; capsule not winged.
9. C. nuttallii.

1. Calochortus nudus S. Wats. Proc. Amer. Acad. **14**: 263. 1879.

Meadows and slopes of the yellow pine and aspen belts; Sierra Nevada. California and western Nevada.

2. Calochortus elegans Pursh, Fl. Amer. Sept. **1**: 240. 1814.

Grassy, shaded slopes in the aspen belt and in pine forests. Montana to Utah (?), westward to Washington and California.

3. Calochortus eurycarpus S. Wats. in King, Geol. Expl. 40th Par. **5**: 348. 1871.

Meadows of the pinyon and yellow pine belts. Montana to northern Utah, Washington, and Oregon.

4. Calochortus kennedyi Porter, Bot. Gaz. **2**: 79. 1877.

Desert areas, canyons, and mountain sides of the Covillea belt. Southern Nevada, southern California, and Arizona.

5. Calochortus aureus S. Wats. Amer. Nat. **7**: 303. 1873.

Canyons and dry hillsides of the artemisia and pinyon belts. Northwestern New Mexico, southern Utah, and Arizona.

6. Calochortus acuminatus Rydb. Bull. Torrey Club **24**: 189. 1897.

Aspen belt; Uintah Mountains (?); Wyoming. Montana to Colorado and Utah (?).

7. Calochortus macrocarpus Dougl. Trans. Hort. Soc. Lond. **7**: 276. *pl.* 8. 1830.

SAGEBRUSH MARIPOSA.

Calochortus bruneaunis Nels. & Macbr. Bot. Gaz. **55**: 372. 1913.

Pine forests. Montana to British Columbia, southward to northern Nevada and Oregon.

8. Calochortus gunnisonii S. Wats. in King, Geol. Expl. 40th Par. **5**: 348. 1871.

GUNNISON MARIPOSA.

Ridges and slopes, La Sal Mountains, at 2,200 to 3,000 meters. Montana to New Mexico, Utah, and Arizona.

9. Calochortus nuttallii Torr. & Gray, in U. S. Rep. Expl. Miss. Pacif. **2**: 124. 1855.

SEGO-LILY.

Foothills and canyons of the artemisia, pinyon, and aspen belts. Montana to New Mexico, westward to California,

This is the State flower of Utah.

10. Calochortus flexuosus S. Wats. Amer. Nat. **7**: 303. 1873.

Slopes and canyons of the yucca, artemisia, and pinyon belts. Southern Utah, Arizona, and Nevada.

17. QUAMASIA Raf. CAMAS

Perianth somewhat oblique, about 2 cm. long, the segments 3-nerved.
1. Q. quamash.
Perianth regular, about 3 cm. long, the segments 5 or 7-nerved.
2. Q. suksdorfii.

1. Quamasia quamash (Pursh) Coville, Proc. Biol. Soc. Washington 11: 64. 1897. COMMON CAMAS.

Phalangium quamash Pursh, Fl. Amer. Sept. 1: 226. 1814.

Camassia esculenta Lindl. Bot. Reg. 18: *pl. 1486*. 1832.

Plains, meadows, and hillsides, upward to 2,400 meters. Montana to British Columbia, southward to Utah and California.

2. Quamasia suksdorfii (Greenm.) Piper, Contr. U. S. Nat. Herb. 11: 191. 1906.

Camassia suksdorfii Greenm. Bot. Gaz. 34: 307. 1902.

Meadows, upward to 2,000 meters; "Falcon Valley." Washington to Idaho and Utah (according to Rydberg).

18. YUCCA L. YUCCA

Leaves narrowly linear, 4 to 10 mm. broad, 20 to 40 cm. long. Capsule oblong, about 5 cm. long, more or less constricted; plants acaulescent.
1. Y. angustissima.
Leaves linear-lanceolate, commonly over 10 mm. broad.
Fruit berry-like, conic-ovoid, 20 cm. long or less; leaves flat or nearly so, 50 to 100 cm. long.
Plant acaulescent; perianth segments 6 to 7 cm. long, lanceolate; style slender, elongated ..... 4. Y. baccata.
Plant arborescent; perianth segments about 4 cm. long, oblong-lanceolate; style short ..... 5. Y. mohavensis.
Fruit a capsule; leaves concave.
Perianth segments oval, obtuse or acute, about 5 cm. long; leaves smooth.
2. Y. harrimaniae.
Perianth segments lanceolate, acute, about 4 cm. long; leaves rough-papillose on the back ..... 3. Y. gilbertiana.

1. Yucca angustissima Engelm.; Trel. Rep. Mo. Bot. Gard. 13: 58. 1902.

Dry mesas and hillsides of the Covillea belt, upward to 2,400 meters. Western Arizona, southern Utah, and Nevada.

2. Yucca harrimaniae Trel. Rep. Mo. Bot. Gard. 13: 59. *pl. 28, 29, 83. f. 10.* 1902.

Dry mesas and hillsides of the artemisia belt. Central Utah to Colorado, Arizona, and New Mexico.

3. Yucca gilbertiana (Trel.) Rydb. Fl. Rocky Mount. 170, 1061. 1917.

Yucca harrimaniae gilbertiana Trel. Rep. Mo. Bot. Gard. 18: 225. 1907.

Gravelly slopes, near Salt Lake Desert; also at Preuss Lake. Western Utah.

4. Yucca baccata Torr. U. S. & Mex. Bound. Bot. 221. 1859.

Dry mesas of the artemisia belt. Texas to Colorado and Nevada.

5. Yucca mohavensis Sarg. Gard. & For. 9: 104. 1896.

Covillea belt. Western Arizona, southern Nevada, and California.

19. CLISTOYUCCA Trel. JOSHUA-TREE

1. Clistoyucca brevifolia (Englm.) Rydb. Fl. Rocky Mount. 170, 1061. 1917.

Yucca brevifolia Engelm. in King, Geol. Expl. 40th Par. 5: 496. 1871.

Yucca arborescens Trel. Rep. Mo. Bot. Gard. 3: 163. *pl. 5, 49.* 1892.

Upper Covillea belt, scattered or forming forests; ranging from 900 meters to 1,200 meters where it extends into the artemisia belt. Southern Utah, Arizona, Nevada, and southern California.

20. ASPARAGUS L. Asparagus

1. Asparagus officinalis L. Sp. Pl. 313. 1753.

Waste ground about settlements; introduced from the Old World.

21. VAGNERA Adans. False Solomonseal

Inflorescence paniculate; sepals and petals about 2 mm. long; berries red, 5 to 6 mm. in diameter; leaves ovate to lanceolate, puberulent. **1. V. amplexicaulis.**

Inflorescence racemose; sepals and petals 6 to 7 mm. long; berries purplish, about 9 mm. in diameter; leaves lanceolate, acuminate, puberulent. **2. V. liliacea.**

1. Vagnera amplexicaulis (Nutt.) Greene, Man. San Franc. Bay 316. 1894.

Smilacina amplexicaulis Nutt. Journ. Acad. Phila. 7: 58. 1834.

Yellow pine, aspen, and spruce belts. British Columbia to New Mexico and California.

2. Vagnera liliacea (Greene) Rydb. Mem. N. Y. Bot. Gard. 1: 101. 1900.

Unifolium liliaceum Greene, Pittonia 1: 280. 1889.

Shaded places of the aspen and spruce belts. British Columbia to New Mexico and California.

22. DISPORUM Salisb. Fairybells

1. Disporum trachycarpum (S. Wats.) Benth. & Hook. Gen. Pl. 3: 832. 1883.

Prosartes trachycarpa S. Wats. in King, Geol. Expl. 40th Par. 5: 344. 1871.

Shaded places of the yellow pine, aspen, and spruce belts. Manitoba to British Columbia, southward to New Mexico and Arizona.

23. STREPTOPUS Michx. Twisted-stalk

1. Streptopus amplexifolius (L.) DC. & Lam. Fl. Franc. 3: 174. 1805.

Uvularia amplexifolia L. Sp. Pl. 304. 1753.

Aspen and spruce belts. Greenland to Alaska, southward to Pennsylvania and Arizona; also in Europe.

24. POLYGONATUM Hill. Solomonseal

1. Polygonatum commutatum (Roem. & Schult.) Dietr.; Otto & Dietr. Gart. Zeit. 3: 223. 1835.

Convallaria commutata Roem. & Schult. Syst. Veg. 7: 1671. 1830.

Woods and shaded places; northern Utah (?). Possibly out of our range. Ontario to Georgia, westward to Manitoba and Utah (?).

25. TRILLIUM L. Trillium

1. Trillium ovatum Pursh, Fl. Amer. Sept. 1: 245. 1814.

Damp woods of the yellow pine, aspen, and spruce belts. Montana to British Columbia, southward to Colorado and California.

22. AMARYLLIDACEAE. Amaryllis Family

Scapose perennial plants with bulbs, corms, or woody caudices; leaves usually sheathing, fleshy, rigid and armed with spiny teeth (in our species);

flowers perfect, racemose or paniculate, 6-merous; perianth united into a tube below; ovary inferior, 3-celled; styles united; fruit a 3-celled capsule or berry; seeds numerous.

1. AGAVE L. AGAVE

1. **Agave utahensis** Engelm. in King, Geol. Expl. 40th Par. 5: 497. 1871.

Desert areas and mountain sides of the Covillea, artemisia, and pinyon belts. Southern Utah, Nevada, Arizona, and southern California.

23. IRIDACEAE. Iris Family

Perennial herbs with fibrous roots; leaves linear, equitant, 2-ranked; flowers perfect, regular or irregular; perianth of 6 segments, from a spathe of 2 or more leaves, the tube adnate to the ovary; stamens 3, inserted on the perianth opposite the external lobes; style 3-cleft; ovary mostly 3-celled, with numerous ovules; fruit a 3-celled loculicidal capsule.

Perianth about 6 cm. long (pale blue in our species), the segments oblanceolate.
  Plant 20 to 100 cm. high, with a thick rootstock; leaves 10 to 40 cm. long, 1 cm. broad or less; capsule oblong, 4 to 6 cm. long----------1. **IRIS.**

Perianth 2 cm. long or less. Grasslike plants with short rootstocks; leaves narrow; scapes 2-edged or 2-winged; flowers in terminal clusters, subtended by 2 bracts----------2. **SISYRINCHIUM.**

1. IRIS L. IRIS

1. **Iris missouriensis** Nutt. Journ. Acad. Phila. 7: 58. 1834.

Wet meadows of the Covillea belt, upward to 3,000 meters. Dakotas to British Columbia, southward to New Mexico and California.

2. SISYRINCHIUM L. BLUE-EYED-GRASS

Perianth rose or purple, 15 to 20 mm. long, the segments obovate, cuspidate.
  Filaments united below; capsule globose, 7 to 8 mm. in diameter.
    1. S. douglasii.

Perianth purplish blue or white, 14 mm. long or less. Filaments more or less united.
  Outer bract of spathe conspicuously longer than the inner one. Leaves 1 to 2.5 mm. broad.
    Perianth segments more or less retuse, deep violet, 10 to 12 mm. long; capsule 4 to 6 mm. in diameter----------2. **S. angustifolium.**
    Perianth segments not at all retuse, white or tinged with purple, 6 to 10 mm. long; capsule obovoid, 6 to 7 mm. long------3. **S. segetum.**
  Outer bract of spathe equaling or slightly exceeding the inner one.
    Stems with several peduncles from leafy nodes. Perianth violet-blue, 10 mm. long; capsule elliptic, glandular-puberulent--4. **S. radicatum.**
    Stems simple and leafless, 10 to 30 cm. high.
      Perianth 10 mm. long or less, bluish purple, the segments abruptly acuminate; capsule puberulent----------5. **S. halophilum.**
      Perianth 12 to 14 mm. long, purple, the segments rounded; capsule subglobose, glabrate----------6. **S. occidentale.**

1. **Sisyrinchium douglasii** A. Dietr. Sp. Pl. 2: 504. 1833.

Sisyrinchium grandiflorum Dougl.; Lindl. Bot. Reg. 16: *pl. 1364*. 1830. Not Cav. 1790.

Wet meadows and canyons of the artemisia, yellow pine, and aspen belts. British Columbia to Utah and California.

2. Sisyrinchium angustifolium Mill. Gard. Dict. ed. 8. *Sisyrinchium* No. 2. 1768.

Meadows, canyons, and mountain sides of the artemisia belt, upward to 2,700 meters. Newfoundland to Virginia, westward to British Columbia and California.

3. Sisyrinchium segetum Bicknell, Bull. Torrey Club **26**: 449. 1899.

Meadows, canyons, and mountain sides of the artemisia belt, upward to 3,000 meters. Washington to California, Nevada, and Utah.

4. Sisyrinchium radicatum Bicknell, Bull. Torrey Club **28**: 576. 1901.

Meadows and canyons of the Covillea belt, upward to 2,400 meters. Wyoming to Arizona and Nevada.

5. Sisyrinchium halophilum Greene, Pittonia **4**: 34. 1899.

Alkaline meadows of the artemisia and pinyon belts. Wyoming, Utah, and Nevada.

6. Sisyrinchium occidentale Bicknell, Bull. Torrey Club **26**: 447. 1899.

Wet meadows and mountain parks, upward to 2,700 meters. Montana to New Mexico, Nevada, and Idaho.

24. ORCHIDACEAE. Orchid Family

(Contributed by Homer C. Skeels)

Perennial herbs with thickened, fibrous or tuberous roots; leaves mostly alternate, entire; inflorescence various; flowers irregular; perianth adnate to the 1-celled ovary; sepals 3, usually petal-like; petals 3, two normal and the third (called the lip) various in shape and often spurred; stamen 1 (2 in *Cypripedium*) united with the style into a column at base of lip; stigma 1, viscid or rough; fruit a 1-celled 3-valved capsule; seeds minute.

Plants without chlorophyll; leaves reduced to brownish sheaths; roots coralloid ..... **8. CORALLORRHIZA.**

Plants with green leaves (often withered at flowering time in *Habenaria unalascensis*); roots not coralloid.

Inflorescence a spirally twisted spike ..... **4. IBIDIUM.**

Inflorescence not a spirally twisted spike.

Leaves solitary; scape 1-flowered ..... **7. CYTHEREA.**

Leaves several; flowers usually more than 1.

Leaves usually white-reticulate, evergreen, in an irregular rosette at base of stem ..... **6. PERAMIUM.**

Leaves not white-reticulate or evergreen, cauline.

Leaves a single pair, nearly as broad as long.

Flowers few, in a loose fascicle; lip an inflated sac. **1. CYPRIPEDIUM.**

Flowers many, racemose; lip not saccate ..... **5. OPHRYS.**

Leaves several, alternate, lanceolate.

Lip saccate, not spurred; leaves prominently veined. **3. SERAPIAS.**

Lip not saccate, spurred; leaves not prominently veined. **2. HABENARIA.**

1. CYPRIPEDIUM L. Ladyslipper

1. Cypripedium fasciculatum Kellogg; S. Wats. Proc. Amer. Acad. **17**: 380. 1882.

Spruce belt; Uinta Mountains (?). Washington to Utah (?) and California.

2. HABENARIA Willd.

Leaves 2 or 3, all at base of stem, usually withered at flowering time; flowers seldom over 5 mm. long----------1. H. unalascensis.
Leaves usually more than 3, extending up the stem, fresh and green at flowering time; flowers usually 5 mm. long or more.
  Lip rhombic-lanceolate, dilated at base; flowers white or greenish white.
    Spur about equaling the lip----------2. H. dilatata.
    Spur much longer than the lip----------2a. H. dilatata leucostachys.
  Lip lanceolate to linear, not dilated at base; flowers green.
    Lip lanceolate; raceme short and dense----------3. H. hyperborea.
    Lip linear; raceme long and loose----------4. H. sparsiflora.

1. **Habenaria unalascensis** (Spreng.) S. Wats. Proc. Amer. Acad. 12: 277. 1877.
   Spiranthes unalascensis Spreng. Syst. Veg. 3: 708. 1826.
   Aspen and spruce belts. Montana to Colorado, California, and Alaska.

2. **Habenaria dilatata** (Pursh) Hook. Exot. Fl. 2: *pl. 95*. 1825.
   Orchis dilatata Pursh, Fl. Amer. Sept. 2: 588. 1814.
   Aspen belt; American Fork Canyon, Utah. Nova Scotia to Alaska, southward to New York, Utah, and Oregon.

2a. **Habenaria dilatata leucostachys** (Lindl.) Ames, Orchid. 4: 71. 1910.
   Platanthera leucostachys Lindl. Gen. Sp. Orchid. 288. 1835.
   Aspen and spruce belts. Alaska to California, Utah, and Arizona.

3. **Habenaria hyperborea** (L.) R. Br. in Ait. Hort. Kew. ed. 2. 5: 193. 1813.
   Orchis hyperborea L. Mant. Pl. 121. 1767.
   Wet places of the spruce belt. Greenland to Alaska, southward to New Jersey, Colorado, and California; also in Iceland.

4. **Habenaria sparsiflora** S. Wats. Proc. Amer. Acad. 12: 276. 1877.
   Wooded canyons and slopes, upward to 3,000 meters; Sierra Nevada. Oregon and California to western New Mexico.

3. SERAPIAS L.

1. **Serapias gigantea** (Dougl.) A. A. Eaton, Proc. Biol. Soc. Washington 21: 67. 1908.
   Epipactis gigantea Dougl.; Hook. Fl. Bor. Amer. 2: 202. *pl. 202*. 1839.
   Wet places under ledges and in wooded canyons, upward to 2,600 meters. Montana to western Texas, westward to British Columbia and California.

4. IBIDIUM Salisb. LADIES-TRESSES

1. **Ibidium romanzoffianum** (Cham.) House, Muhlenbergia 1: 129. 1906.
   Spiranthes romanzoffiana Cham. Linnaea 3: 32. 1828.
   Gyrostachys stricta Rydb. Mem. N. Y. Bot. Gard. 1: 107. 1900.
   Bogs and wet places of the aspen and spruce belts. Newfoundland to Alaska, southward to New York, Colorado, and California.

5. OPHRYS L.

1. **Ophrys convallarioides** (Swartz) W. F. Wight, Bull. Torrey Club 32: 380. 1905.
   Epipactis convallarioides Swartz, Svensk. Vet. Akad. Handl. II. 21: 232 1800.
   Moist forests, at 2,100 to 2,400 meters. Newfoundland to Alaska, southward to Vermont, Michigan, and California.

6. PERAMIUM Salisb. Rattlesnake-plantain

1. **Peramium decipiens** (Hook.) Piper, Contr. U. S. Nat. Herb. 11: 208. 1906.
Spiranthes decipiens Hook. Fl. Bor. Amer. 2: 203. 1839.

Aspen and spruce belts. Quebec to Alaska, southward to New Hampshire, Arizona, and California.

7. CYTHEREA Salisb. Calypso

1. **Cytherea bulbosa** (L.) House, Bull. Torrey Club 32: 382. 1905.
Cypripedium bulbosum L. Sp. Pl. 951. 1753.

Aspen and spruce belts; Uintah Mountains. Labrador to Alaska, southward to Maine, Colorado, and California.

8. CORALLORRHIZA Chatelain. Coralroot

1. **Corallorrhiza maculata** Raf. Amer. Month. Mag. 2: 119. 1817.

Aspen and spruce belts. British Columbia to California and eastward.

25. SAURURACEAE. Lizardtail Family

Perennial stoloniferous herbs with thick aromatic rootstocks; leaves (in our species) radical, cordate-ovate, long-petioled, 10 cm. or more; flowering stem (in our species) with one leaf inserted above the middle and several smaller axillary ones; flowers in a spike, subtended by a 5 to 8-bracted white involucre; perianth none; stamens 3 to 6; styles 3; ovary 1-celled, with 3 parietal placentae; seeds rounded, punctate.

1. ANEMOPSIS Hook. Yerba mansa

1. **Anemopsis californica** (Nutt.) Hook. & Arn. Bot. Beechey Voy. 390. *pl.* 92. 1841.
Anemia californica Nutt. Ann. Nat. Hist. 1: 136. 1838.

Wet places near springs of the Covillea belt. New Mexico to southern Utah, Nevada, and southern California.

26. SALICACEAE. Willow Family

Trees or shrubs; leaves simple, alternate, deciduous, stipulate; flowers dioecious, in catkins; perianth none, the staminate flowers of one or more stamens, subtended by scalelike bracts, the pistillate flowers of a 1-celled many-ovuled ovary, subtended by a minute disk; style 1; stigmas 2, simple or 2 to 4-cleft; fruit a 2 to 4-valved capsule; seeds comose.

Bud scales several; stamens 6 to 80; stigmas entire, or 2 to 4-cleft.
1. POPULUS.

Bud scale 1; stamens 1 to 10, mostly 2; stigmas 2, entire or 2-cleft; flowers subtended by a small gland **2. SALIX.**

1. POPULUS L. Poplar

Leaves more or less densely tomentose or pubescent beneath, broadly ovate, 3 to 5-lobed, irregularly toothed, 6 to 10 cm. long. Petioles shorter than the blades; twigs pubescent or tomentose; staminate flowers with 8 to 20 stamens; styles 2, the stigmas narrow.

Leaves toothed, or lobed to the middle, the lobes simple or with short teeth; branches spreading **1. P. alba.**

Leaves (at least some) deeply lobed, the lobes often coarsely toothed; branches fastigiate **2. P. bolleana.**

Leaves glabrous or puberulent, never tomentose.
Leaf blades lanceolate to ovate-lanceolate, crenulate, 5 to 12 cm. long.
Stamens 12 to 20; stigmas dilated; capsule ovate, rugulose.
5. P. angustifolia.
Leaf blades ovate or deltoid.
Petioles terete or channeled, scarcely if at all compressed.
Leaf blades rhombic-lanceolate to ovate, acuminate, crenulate, green on both sides; fruiting aments 10 to 15 cm. long; capsule 6 to 8 mm. long----4. P. acuminata.
Leaf blades broadly cordate-ovate to ovate, crenulate to nearly entire, acute or short-acuminate, dark green above, paler beneath; fruiting aments 7 to 18 cm. long----6. P. trichocarpa.
Petioles flattened.
Leaves suborbicular, acute or short-acuminate, rounded or cordate, crenulate, 2 to 6 cm. long (root shoot leaves ovate, acute). Stamens 6 or more; stigmas clavate; fruiting aments 2 to 7 cm. long----3. P. aurea.
Leaves of a deltoid type.
Leaf margin glabrous, crenulate, the blades rhombic-ovate, acute to broadly deltoid and abruptly acuminate; branches fastigiate.
8. P. italica.
Leaf margin ciliate or glabrous, crenate-serrate, the blades broadly cordate-deltoid, crenate-serrate, 4 to 7 cm. long, the sinus open; branches yellowish, spreading. Stamens 50 to 80; stigmas dilated; fruiting aments about 10 cm. long; capsule 8 to 10 mm. long, short-stalked----7. P. fremonti.

1. Populus alba L. Sp. Pl. 1034. 1753. WHITE POPLAR.

Planted extensively as a shade and ornamental tree; native of the Mediterranean region and western Asia.

2. Populus bolleana Masters, Gard. Chron. n. ser. **18:** 556. *f. 96.* 1882.

Planted as a shade and ornamental tree; native of Turkestan.

3. Populus aurea Tidestrom, Amer. Midl. Nat. **2:** 35. 1911.

ROCKY MOUNTAIN ASPEN.

Forming dense forests above the pinyon and yellow pine belts. Saskatchewan to New Mexico, westward to California.

This species is distinguished from the eastern *P. tremuloides* by the lighter-colored bark. The leaves of the western form have a less indented margin; and the autumn coloration is golden or orange. In the eastern form the leaves become pale or lemon-yellow after the first frost.

4. Populus acuminata Rydb. Bull. Torrey Club **20:** 50. 1893.

SMOOTHBARK COTTONWOOD.

Canyons and draws, upward to the yellow pine belt; southeastern Utah. Saskatchewan to Texas and Arizona.

5. Populus angustifolia James in Long, Exped. **1:** 497. 1823.

NARROWLEAF COTTONWOOD.

Along watercourses in canyons, upward to the spruce belt; frequently planted about settlements. Saskatchewan to Nebraska, New Mexico, and Nevada.

6. Populus trichocarpa Torr. & Gray; Hook. Icon. Pl. **9:** *pl. 878.* 1852.

BLACK BALSAM POPLAR.

Along watercourses in valleys and canyons of the artemisia, pinyon, and yellow pine belts. Alaska to Nevada and California.

7. Populus fremonti S. Wats. Proc. Amer. Acad. 10: 350. 1875.

FREMONT COTTONWOOD.

Along watercourses in the Covillea and artemisia belts. Utah and Arizona to California.

8. Populus italica Du Roi; Moench. Verz. Bäume Weissenst. 79. 1785.

LOMBARDY POPLAR.

In cultivation; extensively planted for windbreaks and also as an ornamental. In Europe the wood of this tree is used to some extent for pulp and is well adapted for the cheaper grades of paper which have only a transient use. Native of the Mediterranean Region.

Populus nigra L. Sp. Pl. 1034. 1753. BLACK POPLAR.

The typical form with rhombic-acuminate leaves is rare within the limits of the United States. Specimens collected at Austin, Nevada, may prove to belong to it. The species is common both in the wild state and in cultivation in Spain. Forms referred to it by American botanists belong to other species or are hybrids of *P. nigra*.

Populus tremula L., the European aspen, is rarely if ever seen in America. Its wood is used extensively in the manufacture of matches and pulp in Europe. Its near relatives, *P. tremuloides* and *P. aurea*, are equally well adapted for similar uses.

2. SALIX L. WILLOW

(Contributed by C. R. Ball)

Plants undershrubs, 10 cm. high or less. Alpine species.
  Leaves 10 to 12 mm. long——23. S. cascadensis.
  Leaves 15 to 40 mm. long, pale to glaucous beneath.
    Leaves very glaucous beneath and strongly reticulate, elliptic or suborbicular——26. S. saximontana.
    Leaves pale to subglaucous beneath, narrowly elliptic to obovate.
      Leaves elliptic to obovate, glabrous or glabrate——22. S. petrophila.
      Leaves narrowly elliptic, acute, thinly pilose to glabrate.
        22a. S. petrophila caespitosa.

Plants shrubs, 40 cm. high or more, or trees.
  Leaves sessile or subsessile, linear or linear-oblong.
    Leaves glabrous or sparingly pubescent——6. S. melanopsis.
    Leaves silky-pubescent.
      Capsule silky; leaves silvery-silky both sides——7. S. argophylla.
      Capsule glabrous; leaves pubescent beneath——8. S. exigua.
  Leaves distinctly petioled.
    Leaf margin closely serrate or serrulate.
      Leaves green beneath.
        Leaves linear-lanceolate, long-acuminate.
          Leaf bases and petioles not glandular——3. S. gooddingii.
          Leaf bases and petioles glandular——2a. S. caudata parvifolia.
        Leaves lanceolate, oblong-lanceolate, or oblanceolate, acuminate or acute.
          Leaves long-acuminate, the bases and petioles glandular.
            2. S. caudata.
          Leaves acute, the bases and petioles not glandular.
            12. S. pseudomyrsinites.

Leaves glaucous or subglaucous beneath.
Leaves conspicuously long-acuminate.
Petioles and leaf bases glandular; aments elliptic-oblong.
1. S. lasiandra.
Petioles and leaf bases not glandular; aments linear.
4. S. laevigata.
Leaves merely acute or short-acuminate.
Twigs usually yellowish, or reddened on the upper surface in sunny situations.
Leaves acute, on stoutish petioles.
Leaves lanceolate----10. S. lutea.
Leaves ovate-lanceolate----10b. S. lutea platyphylla.
Leaves acuminate, on slender petioles----5. S. amygdaloides.
Twigs usually dark brown, sometimes yellowish.
Leaves ligulate-lanceolate, the margins nearly parallel.
10a. S. lutea ligulifolia.
Leaves obovate or oblanceolate to ovate----11. S. mackenziana.
Leaf margins entire or nearly so.
Leaf blades glabrous when mature (note exceptions).
Leaf blades shining green above, glaucous beneath.
Mature leaves large, mostly 6 to 12 cm. long.
Blades strongly reticulate (and sometimes pubescent beneath).
Blades oblanceolate----9. S. lasiolepis.
Blades narrowly obovate----9a S. lasiolepis bigelovii.
Blades not strongly reticulate, lanceolate when mature.
4. S. laevigata.
Mature leaves small, mostly 2 to 5 cm. long. Twigs shining, chestnut, glabrous.
Leaf blades elliptic-obovate----24. S. chlorophylla.
Leaf blades narrowly elliptic-oblanceolate.
Twigs dark, without bloom; aments sessile----25. S. nelsoni.
Twigs often with bluish bloom; aments leafy-pediceled.
18. S. lemmoni.
Leaf blades dull green above.
Blades deep green beneath----12a. S. pseudomyrsinites aequalis.
Blades pale to glaucous (and sometimes pubescent) beneath.
Blades obovate or oblanceolate, 3 to 8 cm. long
17. S. scouleriana.
Blades elliptic or rhombic-oval, 2 to 5 cm. long--16. S. bebbiana.
Leaves permanently hairy, at least beneath.
Blades more or less silvery-pubescent.
Twigs dark brown, often with a bluish bloom.
Leaves oblanceolate, densely silvery-pubescent beneath.
19. S. subcoerulea.
Leaves narrowly oblanceolate, thinly pilose on both sides.
15. S. geyeriana.
Twigs chestnut to yellow, without a bloom. Leaves small, oblanceolate, pilose on both sides----14. S. wolfii.
Blades more or less gray-woolly on both sides.
Blades green beneath.
Blades elliptic-lanceolate to obovate, with glandular margins.
13. S. eastwoodiae.
Blades narrowly elliptic or linear, not glandular--20. S. orestera.

Blades pale to glaucous beneath.
Blades broadly oblanceolate to obovate, 3 to 10 cm. long.
Blades shining above, glaucous and reticulate beneath.
9a. S. lasiolepis bigelovii.
Blades dull above, pale and subreticulate beneath.
17. S. scouleriana.

Blades oblanceolate, elliptic, or rhombic-elliptic.
Blades mostly 4 to 8 cm. long, shining above---9. S. lasiolepis.
Blades mostly 3 to 5 cm. long, dull above.
Blades glaucous beneath---21. S. glaucops.
Blades pale beneath---16. S. bebbiana.

1. **Salix lasiandra** Benth. Pl. Hartw. 335. 1857.

Along streams and in moist ravines, upward to the yellow pine belt. British Columbia to California, Nevada, and New Mexico.

2. **Salix caudata** (Nutt.) Heller, Muhlenbergia 2: 186. 1906.

Salix pentandra caudata Nutt. N. Amer. Sylv. 1: 61. *pl. 18*. 1842.

Yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to New Mexico and California.

2a. **Salix caudata parvifolia** Ball, Bot. Gaz. 72: 225. *f. 1*. 1921.

Artemisia, pinyon, and yellow pine belts. Alberta to Utah and Oregon.

3. **Salix gooddingii** Ball, Bot. Gaz. 40: 376. *pl. 12, f. 1, 2*. 1905.

Along streams of the Covillea belt. Nevada and California to New Mexico and Mexico.

4. **Salix laevigata** Bebb, Amer. Nat. 8: 202. 1874.

Along streams in the artemisia belt. Oregon and California to Utah.

5. **Salix amygdaloides** Anderss. Proc. Amer. Acad. 4: 53. 1858.

PEACHLEAF WILLOW.

Along streams of the artemisia, pinyon, and yellow pine belts. Quebec to British Columbia, southward to New York, Texas, and Oregon.

6. **Salix melanopsis** Nutt. N. Amer. Sylv. 1: 78. *pl. 21*. 1842.

Along creeks in valleys and canyons, upward to 4,800 meters. California to western Nevada, Utah, and northward.

7. **Salix argophylla** Nutt. N. Amer. Sylv. 1: 71. *pl. 20*. 1842.

Along streams of the artemisia, pinyon, and yellow pine belts. Washington and Oregon to Idaho and northern Utah.

8. **Salix exigua** Nutt. N. Amer. Sylv. 1: 75. 1842.

Along streams, upward to 2,000 meters. Saskatchewan to British Columbia, southward to Mexico.

9. **Salix lasiolepis** Benth. Pl. Hartw. 335. 1857.

Along streams of the Great Basin. Idaho and Washington to Arizona and California.

9a. **Salix lasiolepis bigelovii** (Torr.) Bebb in S. Wats. Bot. Calif. 2: 86. 1880.

Salix bigelovii Torr. U. S. Rep. Expl. Miss. Pacif. 4: 139. 1857.

Along streams in canyons, upward to the aspen belt. California and western Nevada.

10. **Salix lutea** Nutt. N. Amer. Sylv. 1: 63. *pl. 19*. 1842.

Along ditches and streams in the yellow pine, aspen, and spruce belts. Manitoba to Alberta, southward to Nebraska and California.

10a. Salix lutea ligulifolia Ball, Bot. Gaz. **71**: 428. 1921.

Artemisia and pinyon belts. South Dakota to New Mexico, westward to California.

10b. Salix lutea platyphylla Ball, Bot. Gaz. **71**: 430. 1921.

In the artemisia, pinyon, and yellow pine belts. Southwestern Utah to Idaho and Oregon.

11. Salix mackenziana (Hook.) Barratt; Hook. Fl. Bor. Amer. **2**: 149. 1839.

Along streams in the yellow pine, aspen, and spruce belts. Saskatchewan to British Columbia, southward to Wyoming, Utah, and California.

12. Salix pseudomyrsinites Anderss. Öfv. Svensk. Vet. Akad. Förh. **15**: 129. 1858.

Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to New Mexico, Oregon, and Washington.

12a. Salix pseudomyrsinites aequalis Anderss. Öfv. Svensk. Vet. Akad. Förh. **15**: 129. 1858.

Yellow pine and aspen belts. Wyoming and Utah.

13. Salix eastwoodiae Cockerell; Heller, Cat. N. Amer. Pl. ed. 2, 89. 1910.

Along streams and mountain lakes in the aspen and spruce belts. Sierra Nevada.

14. Salix wolfii Bebb in Wheeler, Rep. U. S. Surv. 100th Merid. **6**: 241. 1878.

Spruce and alpine belts. Colorado and Wyoming to Idaho.

15. Salix geyeriana Anderss. Proc. Amer. Acad. **4**: 63. 1858.

Mountain meadows and canyons of the yellow pine, aspen, and spruce belts. Colorado to Oregon.

16. Salix bebbiana Sarg. Gard. & For. **8**: 463. 1895. BEAK WILLOW.

Along streams and in canyons of the artemisia belt, upward to the spruce belt. Quebec to New Jersey, westward to Alaska and California.

17. Salix scouleriana Barratt; Hook. Fl. Bor. Amer. **2**: 145. 1839.

Along streams in canyons of the yellow pine, aspen, and spruce belt. Saskatchewan to Alaska, southward to New Mexico and California.

18. Salix lemmoni Bebb in S. Wats. Bot. Calif. **2**: 88. 1880.

Along streams and mountain lakes of the aspen and spruce belts; Sierra Nevada. California to Idaho and Nevada.

19. Salix subcoerulea Piper, Bull. Torrey Club **27**: 400. 1900.

Along streams and in wet mountain meadows of the aspen and spruce belts. British Columbia to New Mexico and California.

20. Salix orestera C. Schneid. Journ. Arn. Arb. **1**: 164. 1920.

Aspen, spruce, and subalpine belts. California and Nevada.

21. Salix glaucops Anderss. in DC. Prodr. **16²**: 281. 1868.

Yellow pine, aspen, spruce, and subalpine belts. Alberta to Alaska, southward to New Mexico and California.

22. Salix petrophila Rydb. Bull. N. Y. Bot. Gard. **1**: 268. 1899.

Alpine belt. British Columbia to California, eastward to Mackenzie and New Mexico.

22a. Salix petrophila caespitosa (Kennedy) C. Schneid. Bot. Gaz. **66**: 136. 1918.

Salix caespitosa Kennedy, Muhlenbergia **7**: 135. *pl. 9*. 1912.

Subalpine belt; Sierra Nevada. California and Nevada.

23. Salix cascadensis Cockerell, Muhlenbergia **3**: 9. 1907.

Salix tenera Anderss. in DC. Prodr. **16**²: 288. 1868. Not *S. tenera* A. Br. 1850.

Alpine belt; Uintah Mountains. British Columbia to Utah and Montana.

24. Salix chlorophylla Anderss. Svensk. Vet. Akad. Handl. **6**: 138. 1867.

Spruce and subalpine belts. Labrador to Alaska, southward to New Hampshire, New Mexico, and California.

25. Salix nelsoni Ball, Bot. Gaz. **40**: 379. 1905.

Spruce and subalpine belts; Uinta Mountains (?). Alberta to Colorado and Utah.

26. Salix saximontana Rydb. Bull. N. Y. Bot. Gard. **1**: 261. 1899.

Subalpine and alpine belts. Alberta and Washington to New Mexico and Nevada.

27. BETULACEAE. Birch Family

Shrubs or trees, mostly with smooth bark; leaves simple, alternate, straight-veined; stipules caducous; flowers monoecious (rarely dioecious), the staminate in scaly catkins; stamens 2 to 4; pistillate flowers in clusters, spikes, or scaly catkins; styles 2; ovary 2-celled, with 2 ovules in each cell; fruit apparently 1-celled.

Fruiting bracts saclike, membranous, closed, 1.5 to 2 cm. long. Fruit a nut, sessile at base of the bract; leaves ovate, acute or acuminate, doubly serrate, 4 to 5 cm. long ..... 1. OSTRYA.

Fruiting bracts not saclike.

Fruiting bracts deciduous, 3-lobed or entire; fertile catkins ovoid or cylindric; nut small, usually winged ..... 2. BETULA.

Fruiting bracts persistent, woody, erose or toothed; fertile catkins ovoid or oblong; nut small, winged or wingless ..... 3. ALNUS.

1. OSTRYA Scop. Hophornbeam

1. Ostrya knowltoni Coville, Gard. & For. **7**: 114. *f.* 23. 1894.

Canyons of the pinyon belt. Utah and Arizona.

2. BETULA L. Birch

Leaves broadly obovate, crenate, 1 cm. broad or more; fruiting catkins 1 to 1.5 cm. long; shrub 1 to 2 meters high ..... 1. B. glandulosa.

Leaves ovate, serrate, 1.5 to 3 cm. broad; fruiting-catkins oblong or cylindric, 2.5 to 3 cm. long; tree ..... 2. B. fontinalis.

1. Betula glandulosa Michx. Fl. Bor. Amer. **2**: 180. 1803. Dwarf birch.

Spruce belt; Uinta Mountains. Greenland to Alaska, southward to Maine, Colorado, northern Utah, and Oregon .

2. Betula fontinalis Sargent, Bot. Gaz. **31**: 239. 1901. Water birch.

Betula utahensis Britton, Bull. Torrey Club **31**: 165. 1904.

Along creeks in canyons of the pinyon and aspen belts. Saskatchewan to Nebraska, British Columbia, and California.

3. ALNUS Hill. Alder

1. Alnus tenuifolia Nutt. N. Amer. Sylv. **1**: 32. 1842.

Along creeks in canyons of the pinyon and aspen belts. Alaska to California and New Mexico.

28. FAGACEAE. Beech Family

Shrubs or trees with simple alternate leaves; flowers monoecious; staminate flowers in aments; perianth 4 to 7-parted; stamens 4 to 20; pistillate flowers solitary or in spikes; perianth cup-shaped; styles 3; ovary 3-celled.

Plant a shrub (in our species) with coriaceous evergreen cuneate-oblong entire leaves, 2 to 8 cm. long, the leaves green and glabrous above, more or less scurfy beneath; staminate flowers in erect aments, 5 or 6-merous; pistillate flowers 1 to 3 in a scaly involucre; fruit of 1 to 3 nuts enclosed in a prickly involucre (bur), maturing the second year_____1. CASTANOPSIS.

Plants trees, or shrubs with deciduous or evergreen leaves of various forms; staminate flowers in drooping aments, 4 to 8-merous; pistillate flowers single or in clusters; ovary becoming a 1-seeded nut or acorn, enclosed in an indurated scaly involucre (cup)_____2. QUERCUS.

1. CASTANOPSIS Spach.

1. Castanopsis sempervirens (Kellogg) Dudley in Merriam, N. Amer. Fauna 16: 142. 1899. CALIFORNIA CHINQUAPIN.

Castanea sempervirens Kellogg, Proc. Calif. Acad. 1: 75. 1855.

Castanopsis chrysophylla minor S. Wats. in King, Geol. Expl. 40th Par. 5: 322. 1871. Not *C. chrysophylla minor* Benth. 1857.

Rocky slopes and summits, upward to 3,000 meters. California and adjacent Nevada.

2. QUERCUS L. OAK

Leaves more or less deeply lobed, deciduous, the lobes rounded or acute, not spinulose-tipped; acorns maturing the first season. WHITE OAKS.

Leaves of an oblong outline, more or less deeply cleft, the lobes rounded or acute, forming an acute angle with the midrib; blades 5 to 10 cm. long, more or less densely pubescent to glabrate (in age); acorn subsessile, ovoid, obtuse or acute, 12 to 15 mm. long, the cup somewhat turbinate to hemispheric; shrub or small tree, 1 to 5 meters high__1. Q. gambelii.

Leaves of obovate outline, more or less deeply cleft, the lobes (at least the middle pairs) more or less divaricate, mostly truncate, rounded or somewhat lobed again, stellate-pubescent to glabrate; acorn subsessile, ovate, 15 to 20 mm. long; cup hemispheric, with more or less thickened, obtuse or acute scales; shrub or small tree, 2 to 10 meters high.

2. Q. utahensis.

Leaves entire, sinuate or dentate with spinulose teeth or lobes, persistent; acorns maturing the second year. BLACK OAKS.

Leaves and twigs glabrous or nearly so, normally oval to ovate-lanceolate, obtuse or acute, glaucous and reticulate beneath, entire or with few teeth, 2 to 3 cm. long. Acorn ovate, 1 cm. long or more; cup broadly turbinate, with pubescent scales; shrub 2 to 7 meters high.

3. Q. vaccinifolia.

Leaves and twigs (at least when young) more or less stellate-pubescent or scurfy.

Leaves obovate or broadly oval, commonly less than 5 cm long, sinuately 5 to 7-lobed, reticulate, with 7 or more pairs of ribs, grayish green. Acorn oblong, 15 mm. long or less; cup hemispheric, 12 mm. in diameter or more, the scales ovate-acuminate; tree about 5 meters high_____4. Q. undulata.

Leaves of an oval, elliptic, or ovate-oblong and acute type, 1 to 4 cm. long.
Leaves broadly oval, short-acuminate, spinulose-dentate, shining above, grayish white and punctate beneath, the veins and reticulation indistinct; acorn ovoid, about 15 mm. long; cup hemispheric, the scales ovate, stellate-pubescent; tree or shrub, 6 to 9 meters high ..... 5. Q. wilcoxii.
Leaves oblong to ovate, acute, sinuate-dentate with spinulose tips, 1 to 3 cm. long, bluish green above, strongly reticulate and fulvous beneath; acorn elongate-ovoid, 2 cm. long or less; cup turbinate, the scales ovate, obtuse, tomentulose; shrub, 1 to 3 meters high ..... 6. Q. turbinella.

1. **Quercus gambelii** Nutt. Journ. Acad. Phila. II. 1: 179. 1848.
Quercus douglasii gambelii A. DC. Prodr. 16²: 23. 1864.
Forming dense colonies in the pinyon belt. Wyoming to New Mexico and southern Nevada (Charleston Mountains).

2. **Quercus utahensis** (A. DC.) Rydb. Bull. N. Y. Bot. Gard. 2: 202. 1901.
Quercus stellata utahensis A. DC. in DC. Prodr. 16 ²: 22. 1864.
Quercus alba gunnisonii S. Wats. in King, Geol. Expl. 40th Par. 5: 321. 1871.
Quercus submollis Rydb. Bull. N. Y. Bot. Gard. 2: 202. *pl. 25, f. 1.* 1901.
Forming colonies in the pinyon belt. Utah, Colorado, New Mexico, and Arizona.

3. **Quercus vaccinifolia** Kellogg, Proc. Calif. Acad. 1: 106. 1855.
Quercus chrysolepis vaccinifolia Engelm. Trans. Acad. St. Louis 3: 393. 1877.
Sand dunes and mountain sides, at 1,800 meters or more (?). California and adjacent Nevada.

4. **Quercus undulata** Torr. Ann. Lyc. N. Y. 2: 248. 1828.
Quercus pauciloba Rydb. Bull. N. Y. Bot. Gard. 2: 215. *pl. 30, f. 2.* 1901.
Canyons and slopes, upward to 1,200 meters; southern Utah. Northern New Mexico to southern Utah and southern Texas.

5. **Quercus wilcoxii** Rydb. Bull. N. Y. Gard. 2: 227. 1901.
Quercus chrysolepis var. Greene, Pittonia 2: 112. 1890.
Canyons and dry hillsides, upward to 1,200 meters. Southern Utah, Nevada, and Arizona.

6. **Quercus turbinella** Greene, W. Amer. Oaks 1: 37. 1889; 2: 59. 1890.
Dry hills, upward to 1,200 meters. Southern Utah and Nevada to New Mexico and southern and Lower California.

29. ULMACEAE. Elm Family

Trees or shrubs; leaves alternate, 2-ranked, simple, with oblique base, ovate to ovate-lanceolate or ovate-oblong, 2 to 6 cm. long; stipules fugacious; flowers monoecious, 4 or 5-merous, the staminate clustered, the pistillate solitary or clustered; corolla none; stamens as many as the calyx lobes and opposite these; ovary 1-celled; styles or stigmas 2.

Leaves ovate to ovate-lanceolate, serrate, reticulate beneath; fruit a drupe. 1. CELTIS.
Leaves ovate-oblong, doubly serrate, straight-veined, the base very unequal; fruit a winged nut (samara) ..... 2. ULMUS.

1. CELTIS L. Hackberry

1. **Celtis douglasii** Planch. Ann. Sci. Nat. III. 10: 293. 1848.
Celtis villosula Rydb. Pl. Rocky Mount. ed. 2. 1116. 1922.
Rocky hillsides and canyons of the artemisia and pinyon belts. Washington to Nevada and Utah.

2. ULMUS L. Elm

Leaves glabrous or nearly so on the upper face_____1. U. americana.
Leaves very rough on the upper face_____2. U. fulva.

1. Ulmus americana L. Sp. Pl. 226. 1753. American elm.

Common in cultivation. Newfoundland to Manitoba, southward to Florida and Texas.

2. Ulmus fulva Michx. Fl. Bor. Amer. 1: 172. 1803. Slippery elm.

In cultivation and escaped. Virginia to Florida, westward to Illinois and Texas.

30. CANNABINACEAE. Hemp Family

Twining perennial (our species); leaves opposite, palmately 3 to 7-lobed, cordate, the lobes ovate, serrate; flowers dioecious, the staminate in loose panicles, 5-merous, the pistillate in bracted spikes; bracts foliaceous, imbricate, each subtending a pair of flowers; calyx membranaceous, entire, enclosing the 1-celled ovary; petals none; stamens as many as the calyx lobes and opposite them; ovary 1-celled; stigmas elongate; fruit (in our species) an achene, enclosed in the calyx (the spike of flowers forming a membranaceous strobile).

1. HUMULUS L. Hop

1. Humulus americanus Nutt. Journ. Acad. Phila. II. 1: 181. 1848.

Canyons of the pinyon, yellow pine, aspen, and spruce belts. Wyoming to New Mexico, Utah, and Arizona.

31. MORACEAE. Mulberry Family

Trees or shrubs with milky sap; leaves alternate; stipules fugacious; flowers monoecious or dioecious, 4 or 5-merous, in axillary heads or spikes; calyx becoming fleshy in fruit; petals none; stamens as many as the calyx lobes and opposite them; styles 1 or 2; ovary superior, mostly 1-celled; ovules solitary; fruit aggregate.

Leaves rhombic-ovate to oblong-lanceolate, entire, acuminate. Staminate flowers in a loose raceme, the pistillate in a globular head; fruit an aggregation of achenes, 5 to 15 cm. in diameter; tree with stout axillary spines_____2. TOXYLON.
Leaves broadly ovate, serrate to deeply 3 or 5-lobed.
Leaves ovate, serrate to lobed, glabrous, cordate or rounded at base; fruit oblong or globose, 10 to 14 mm. long, white or pinkish____1. MORUS.
Leaves broadly cordate, 3 or 5-lobed, serrate, scabrous, 10 cm. long or more; fruit obovoid, 3 to 8 cm. long, the accrescent receptacle completely enclosing the achenes_____3. FICUS.

1. MORUS L. Mulberry

1. Morus alba L. Sp. Pl. 986. 1753.

In cultivation throughout the United States. Native of the Mediterranean region.

2. TOXYLON Raf. Osage-orange

1. Toxylon pomiferum Raf. Amer. Month. Mag. 2: 118. 1817.

In cultivation; southern Nevada. Missouri, Kansas, and Texas.

3. FICUS L. Fig

1. **Ficus carica** L. Sp. Pl. 1059. 1753.

In cultivation; southern Utah to California. Native of the Mediterranean region.

32. URTICACEAE. Nettle Family

Annual or perennial herbs; leaves with stipules; flowers in axillary cymes, inconspicuous, monoecious, dioecious, or polygamous, mostly 4-merous; petals none; stamens as many as the sepals and opposite them; style 1; ovary 1-celled; fruit an achene.

Leaves opposite, toothed, 5 or 7-ribbed; plants with stinging hairs__1. **URTICA.**
Leaves alternate, entire, 3-ribbed; small, glabrous, pubescent, or villous herbs, without stinging hairs _____2. **PARIETARIA.**

1. URTICA L. Nettle

Leaf blades broadly ovate to ovate-oblong, coarsely toothed, often shorter than the petioles. Plant hispid, 30 cm. high or more; stipules very small. **3. U. urens.**
Leaf blades (at least the lower) commonly over 7 cm. long, ovate or cordate-ovate to ovate-oblong, acute or acuminate. Pubescence of two kinds.
Stipules oblong or broadly lanceolate, obtuse or acute; leaves lanceolate to cordate, more or less densely pubescent beneath, sparingly so above_____1. **U. breweri.**
Stipules linear to narrowly lanceolate; leaves lanceolate, acute or acuminate, cordate or rounded at base, strigose to glabrate on both faces. **2. U. gracilis.**

1. **Urtica breweri** S. Wats. Proc. Amer. Acad. 10: 348. 1875.

Valleys and canyons of the artemisia, pinyon, and aspen belts. Utah to California and Oregon.

2. **Urtica gracilis** Ait. Hort. Kew. 3: 341. 1789.
Urtica strigosissima Rydb. Bull. Torrey Club 39: 305. 1912.

Valleys and canyons, upward to the aspen belt. Nova Scotia to North Carolina, westward to Alaska and Arizona.

3. **Urtica urens** L. Sp. Pl. 984. 1753.

Waste places; southern Nevada. Introduced from Europe.

2. PARIETARIA L. Pellitory

Leaves rounded at base, ovate-oblong to oblong; involucral bracts oblong, obtuse; plants more or less villous, branching from the base_____1. **P. obtusa.**
Leaves cuneate at base, lanceolate; involucral bracts linear, obtuse; plants more or less puberulent or villous, simple or branching from the base. **2. P. pennsylvanica.**

1. **Parietaria obtusa** Rydb.; Small, Fl. Southeast. U. S. 359. 1903.

Shaded places of the Covillea, artemisia, and pinyon belts. Colorado to Texas, Utah, and southern California.

2. **Parietaria pennsylvanica** Muhl.; Willd. Sp. Pl. 4: 955. 1805.

Shaded places, on banks and among rocks of the Covillea belt, upward to the aspen belt. Ontario to Florida, westward to British Columbia, Nevada, and Mexico.

The name *Parietaria* (belonging to walls) was applied to this genus from the fact that the most common species grew upon old garden walls and old ruins. The same meaning is expressed in the old Irish word *Lusan bhalla*.

33. LORANTHACEAE. Mistletoe Family

Green parasitic shrubs; leaves in our species opposite, ample or scalelike; flowers in terminal or axillary jointed clusters or spikes, monoecious or dioecious; perianth 2 to 5-lobed, the tube adnate to the ovary; stamens as many as the lobes of the perianth; ovule solitary; style simple or wanting; fruit a berry.

Branches terete or quadrangular; leaves (in our species) mostly connate scales; flowering spikes few-flowered; berry globose, pulpy. **1. PHORADENDRON.**

Branches angled, glabrous; leaves scalelike; flowers axillary or terminal; fruit a compressed berry ---------- **2. RAZOUMOFSKYA.**

1. PHORADENDRON Nutt. Mistletoe

Branches 30 to 60 cm. long, pubescent; berry 4 mm. in diameter, reddish. **1. P. californicum.**

Branches 15 to 30 cm. long or more, glabrous; berry about 3 mm. in diameter, whitish or light red.

Branches terete, stout ---------- **2. P. juniperinum.**

Branches quadrangular.

Scales scarcely if at all constricted at base ---------- **3. P. libocedri.**

Scales constricted at base ---------- **4. P. ligatum.**

1. Phoradendron californicum Nutt. Journ. Acad. Phila. II. 1: 185. 1848.
Parasitic on Mimosaceae. California, Arizona, southern Nevada, and Utah.

2. Phoradendron juniperinum Engelm. Mem. Amer. Acad. n. ser. 4: 58. 1849.
Parasitic on *Juniperus*. Colorado to Oregon, California, Texas, and Mexico.

3. Phoradendron libocedri (Engelm.) Howell, Fl. Northw. Amer. 608. 1902.
Phoradendron juniperinum libocedri Engelm. in S. Wats. Bot. Calif. 2: 105. 1880.
Parasitic on *Libocedrus decurrens*. Western Nevada and California.

4. Phoradendron ligatum Trel. Phoradendr. 24. *pl. 3, 15.* 1916.
Parasitic on *Juniperus*. Oregon, Nevada, and California.

2. RAZOUMOFSKYA Hoffm.

Staminate flowers at the end of the branchlets, pediceled and disposed in a panicle. Fruit bluish, 2 to 3 mm. long ---------- **1. R. americana.**

Staminate flowers mostly axillary, disposed in spikes.

Stems stout, 2 to 5 mm. in diameter, 5 to 20 cm. long, yellowish brown. Fruit about 5 mm. long ---------- **2. R. cryptopoda.**

Stems 2 mm. in diameter or less.

Accessory branchlets of fruiting specimens mostly leaf-bearing. Fruit 3 to 4 mm. long ---------- **3. R. divaricata.**

Accessory branchlets of fruiting specimens flower-bearing or bearing both leaves and flowers in No. 6.

Fruit obovoid, 3 mm. long, not manifestly stipitate ---- **4. R. cyanocarpa.**

Fruit evidently stipitate.

Plants 3 cm. high or less, slender; fruit 5 mm. long -- **5. R. douglasii.**

Plants 4 to 6 cm. high; fruit 5 mm. long -- **6. R. occidentalis abietina.**

1. **Razoumofskya americana** (Nutt.) Kuntze, Rev. Gen. Pl. **2**: 587. 1891.
   Arceuthobium americanum Nutt.; Engelm. Bost. Journ. Nat. Hist. **6**: 214. 1850.
   On *Pinus murrayana*. Saskatchewan to Colorado and California.
2. **Razoumofskya cryptopoda** (Engelm.) Coville, Contr. U. S. Nat. Herb. **4**: 192. 1893.
   Arceuthobium cryptopodum Engelm. Bost. Journ. Nat. Hist. **6**: 214. 1850.
   On *Pinus brachyptera* and allied species. South Dakota and Montana, southward to New Mexico and Arizona.
3. **Razoumofskya divaricata** (Engelm.) Coville, Contr. U. S. Nat. Herb. **4**: 192. 1893.
   Arceuthobium divaricatum Engelm. in Wheeler, Rep. U. S. Surv. 100th Merid. **6**: 253. 1878.
   On *Pinus edulis* and allies. Southern Colorado and New Mexico to Nevada.
4. **Razoumofskya cyanocarpa** A. Nels.; Rydb. Colo. Agr. Exp. Sta. Bull. **100**: 101. 1906.
   Arceuthobium cyanocarpum A. Nels. in Coulter, New Man. Rocky Mount. 146. 1909.
   On *Pinus flexilis*. Wyoming to New Mexico.
5. **Razoumofskya douglasii** (Engelm.) Kuntze, Rev. Gen. Pl. **2**: 587. 1891
   Arceuthobium douglasii Engelm. in Wheeler, Rep. U. S. Surv. 100th Merid. **6**: 253. 1878.
   On *Pseudotsuga mucronata*. Montana to New Mexico, westward to Oregon and Arizona.
6. **Razoumofskya occidentalis abietina** (Engelm.) Howell, Fl. Northw. Amer. 609. 1902.
   Arceuthobium abietinum Engelm. Proc. Amer. Acad. **8**: 401. 1872.
   On *Abies concolor*. Oregon, California, and Nevada.

34. SANTALACEAE. Sandalwood Family

Trees, shrubs, or herbs (in our species root parasites); leaves without stipules, alternate or opposite, entire; flowers (in our species) cymose or in umbellate clusters, perfect; calyx campanulate, 3 to 5-lobed; petals none; stamens as many as the calyx lobes; ovary 1-celled; ovules 2 or more from a central placenta; style 1; fruit drupaceous.

1. COMANDRA Nutt.

1. **Comandra pallida** A. DC. in DC. Prodr. **14**: 636. 1857.
   Plains and hillsides of the Covillea belt, upward to the aspen belt. Minnesota to Texas, California, and British Columbia.

35. POLYGONACEAE. Buckwheat Family

Herbs or undershrubs, erect or climbing; leaves alternate, opposite, or whorled; stipules sheathlike (ocreae) or wanting; flowers perfect or polygamo-dioecious; perianth more or less persistent; stamens 4 to 9; styles 2 or 3; ovary 1-celled, 1-ovuled; fruit an achene or utricle, compressed, 3 or 4-angled, or winged.

Leaves opposite or basal; sheathing stipules wanting.

Flowers subtended by one or more distinct bracts, or the bracts wanting.

Perianth 5 or 6-parted; stamens 9 or fewer; prostrate, dichotomously or diffusely branched annuals.

Leaves in pairs, flabelliform, obcordate or spatulate, 1 cm. long or less, pubescent; flowers sessile, axillary; achenes 3-angular, glabrous.
1. PTEROSTEGIA.
Leaves in 3's, obovate, 1 cm. long or less; flowers pediceled, axillary; achenes smooth, shining. Plant 4 cm. high or more, yellowish green.
5. PHYLLOGONUM.

Flowers borne in a tubular or turbinate involucre.
Teeth of the involucre not bristle-tipped----4. ERIOGONUM.
Teeth of the involucre spine-tipped or bristle-tipped. Small annuals; leaves mostly basal, the cauline often reduced to bracts.
Flowers included; involucre usually 1-flowered, mostly 5 or 6-toothed, the lobes ending in hooked or straight bristles; achenes 3-angular.
2. CHORIZANTHE.
Flowers exserted; involucre 2 to many-flowered, mostly 4 or 5-cleft, the lobes ending in straight bristles; achenes lenticular.
3. OXYTHECA.

Leaves alternate or basal; sheathing stipules present.
Plants twining. Flowers in axillary clusters; achenes 3-angular, brown or black----12. BILDERDYKIA.
Plants not twining.
Leaves reniform or orbicular-reniform, mostly basal. Perianth segments 4; stamens 6; achenes lenticular, broadly winged; low perennial.
7. OXYRIA.

Leaves not reniform.
Leaf blades jointed at base. Achenes 3-angular--8. POLYGONUM.
Leaf blades not jointed at base.
Stigmas peltate, tufted. Perianth segments and stamens 6; achenes 3-angular----6. RUMEX.
Stigmas capitate, 2-cleft or toothed.
Flowers in large panicles. Caulescent perennial, 1 to 2 meters high; leaf blades lanceolate, crisped, ciliate; achenes 3-angular----9. ACONOGONUM.
Flowers in racemes or spikes.
Ocreae cylindric, truncate; achenes lenticular, rarely 3-angular----11. PERSICARIA.

Ocreae more or less open, oblique; achenes 3-angular, rarely lenticular----10. BISTORTA.

1. PTEROSTEGIA Fisch. & Mey.

1. Pterostegia drymarioides Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 23. 1835.

Foothills and canyons of the Covillea belt; St. George, Utah. Oregon to southern California, Arizona, and Utah.

2. CHORIZANTHE R. Br.

Bracts 3-lobed; plants glabrous or glandular. Involucre spurred at base; leaves elliptic to oblong, 6 to 8 mm. long----5. C. thurberi.
Bracts entire; plants pubescent or villous.
Lower leaf blades linear to narrowly oblanceolate; plants not forming spiny mats.
Involucral tube distinctly 6-ribbed. Leaves linear-oblanceolate, 10 to 25 mm. long or more; plants very brittle, 5 to 20 cm. high.
1. C. brevicornu.

Involucral tube not ribbed; plants not brittle, 5 to 10 cm. high. Leaves narrowly oblanceolate, 20 mm. long or less_____2. C. watsoni.
Lower leaf blades obovate to round-ovate, 8 to 20 mm. long, long-petioled; plants diffuse, forming spiny mats.
Involucral tube 3-angled, the teeth lanceolate, spiny_____3. C. rigida.
Involucral tube cylindric, corrugated, the teeth small, curved.
4. C. corrugata.

1. **Chorizanthe brevicornu** Torr. U. S. & Mex. Bound. Bot. 177. 1859.
Chorizanthe spathulata Small, Bull. Torrey Club 39: 309. 1912.
Desert areas and dry foothills of the Covillea and artemisia belts. Southwestern Utah, Arizona, Nevada, and southern California.

2. **Chorizanthe watsoni** Torr. & Gray, Proc. Amer. Acad. 8: 199. 1870.
Desert areas and stony hillsides of the Covillea and artemisia belts. Eastern Washington and Idaho, southward to Utah and California.

3. **Chorizanthe rigida** (Torr.) Torr. & Gray, Proc. Amer. Acad. 8: 198. 1870.
Acanthogonum rigidum Torr. U. S. Rep. Expl. Miss. Pacif. 4[5]: 133. 1857.
Desert areas and dry hillsides. Southwestern Utah and Arizona to Nevada and southern and Lower California.

4. **Chorizanthe corrugata** (Torr.) Torr. & Gray, Proc. Amer. Acad. 8: 198. 1870.
Acanthogonum corrugatum Torr. U. S. Rep. Expl. Miss. Pacif. 5[2]: 364. 1857.
Desert areas and dry hillsides. Southern and Lower California to Arizona and southern Nevada.

5. **Chorizanthe thurberi** (A. Gray) S. Wats. Proc. Amer. Acad. 12: 269. 1877.
Centrostegia thurberi A. Gray; Benth. in DC. Prodr. 14: 27. 1856.
Desert areas and dry hillsides of the Covillea and artemisia belts. Southwestern Utah and Arizona to southern Nevada and California.

3. OXYTHECA Nutt.

Involucral bracts united into a round concave bristle-pointed perfoliate disc.
Leaves oblong-oblanceolate; plants erect, dichotomously branched.
1. O. perfoliata.
Involucral bracts not perfoliate, united only at base.
Leaves oblanceolate, obtuse, glandular. Involucre turbinate, 1 mm. long, the awn elongate_____3. O. watsoni.
Leaves linear-oblanceolate, acute, hirsute.
Basal leaves 4 mm. broad or less; awns variable_____2. O. dendroidea.
Basal leaves 6 to 7 mm. broad; awns commonly elongate.
2a. O. dendroidea foliosa.

1. **Oxytheca perfoliata** Torr. & Gray, Proc. Amer. Acad. 8: 191. 1870.
Desert areas and hillsides of the Covillea and artemisia belts. Arizona, Nevada, and California.

2. **Oxytheca dendroidea** Nutt. Journ. Acad. Phila. II. 1: 169. 1848.
Plains and hillsides of the artemisia belt. Washington to Wyoming, Nevada, and California.

2a. **Oxytheca dendroidea foliosa** (Nutt.) Jones, Contr. West. Bot. 11: 4. 1903.
Oxytheca foliosa Nutt. Journ. Acad. Phila. II. 1: 169. 1848.
?Oxytheca dendroidea hillmani Stokes; Jones, Contr. West. Bot. 11: 4. 1903.
Plains and hillsides of the artemisia belt. Washington to Wyoming and Nevada.

3. **Oxytheca watsoni** Torr. & Gray, Proc. Amer. Acad. 8: 191. 1870.

Desert areas and dry hillsides of the Covillea and artemisia belts. Nevada and southern California.

4. ERIOGONUM Michx.

Plants annual (cespitose perennial in Nos. 25 and 26); involucres turbinate or campanulate, borne on scattered pedicels (except in Nos. 2 and 3), never in heads, 4 or 5-toothed or lobed, not angled_____Subgenus 1. Ganysma.

Plants annual or perennial; involucres solitary, in congested heads or in umbels, cylindric or cylindric-turbinate to campanulate, 4 to 8-toothed or lobed, often ribbed or angled.

Perianth mostly with a stipelike base; involucres 4 to 8-toothed or lobed, solitary, in heads, or umbels_____Subgenus 3. Eueriogonum.

Perianth without a stipelike base, mostly sessile; involucres 5 (or 6)-toothed, ribbed or angled, solitary or in heads_____Subgenus 2. Oregonium.

Subgenus 1. Ganysma

Plant a cespitose scapose perennial, 30 cm. high or less. Leaves orbicular to ovate, white-tomentose, 1 cm. long or less; involucre and perianth glabrous. 26. E. tenellum.

Plants annual.

Stems leafy at the nodes, or the bracts leaflike.

Involucres sessile or nearly so, pubescent. Leaves spatulate to orbicular; plants pubescent, 10 to 25 cm. high.

Primary leaves scalelike, the secondary well developed. 3. E. divaricatum.

Primary leaves well developed_____2. E. puberulum.

Involucres on slender pedicels.

Involucre silky-villous. Leaves linear, villous or tomentose. 5. E. pharnaceoides.

Involucres glabrous, glandular, or sparingly pubescent.

Involucre glandular, broadly campanulate.

Perianth segments white or pink_____1. E. angulosum.

Outer perianth segments yellow, with red center. 1a. E. angulosum maculatum.

Involucres glabrous or sparingly pubescent.

Involucre of linear-lanceolate bracts; leaves oblanceolate to linear; plant diffuse_____6. E. salsuginosum.

Involucre very small, 4-cleft; leaves linear; plant mostly erect, the branches filiform, spreading_____4. E. spergulinum.

Stems commonly leafless.

Perianth hispid, glandular, or pubescent.

Stems distinctly inflated (commonly below the first node). Peduncles filiform; perianth densely hispid_____25. E. inflatum.

Stems not inflated or only imperceptibly so.

Outer perianth segments saccate and unlike the inner ones. Leaves orbicular, tomentose or floccose_____11. E. thomasii.

Perianth segments all alike.

Peduncles glandular. Leaves hirsute, green, reniform; perianth yellow_____21. E. glandulosum.

Peduncles glabrous. Plants 10 to 60 cm. high or more.

Plant 10 to 30 cm. high; leaves obovate or rounded; involucre glandular; perianth yellow_____15. E. pusillum.

Plants 15 to 60 cm. high or more; leaves reniform to elliptic; perianth greenish or white.
Stems tomentose below, glabrate above; leaves elliptic; pedicels filiform---22. E. ordii.
Stems glabrous; leaves cordate-elliptic to reniform; pedicels filiform.
Leaves cordate-elliptic, hispid, wavy-margined.
23. E. trichopes.
Leaves reniform, not wavy-margined---24. E. reniforme.
Perianth glabrous.
Outer perianth segments with a broad, generally subcordate base, the inner ones smaller.
Involucres glandular. Leaves reniform-orbicular, tomentose.
Involucre turbinate, on pedicels rarely over 2 mm. long.
9. E. brachypodum.
Involucre campanulate, on pedicels 3 to 30 mm. long or more.
10. E. parryi.
Involucres glabrous or pubescent. Pedicels 1 to 2 mm. long; leaf blades orbicular to subcordate-orbicular, tomentose (at least beneath).
Involucre turbinate; perianth white or rose-colored--7. E. deflexum.
Involucre broadly campanulate; perianth pale yellow--8. E. hookeri.
Outer perianth segments not broad or cordate at base, the segments similar or dissimilar.
Involucres turbinate, on pedicels 5 mm. long or more. Leaf blades orbicular to subreniform, tomentose (at least beneath).
12. E. watsoni.
Involucres campanulate.
Pedicels and involucre glandular. Leaf-blades orbicular, floccose or tomentose---20. E. nutans.
Pedicels and involucre glabrous or nearly so.
Leaves cuneate-obovate, hirsutulous. Perianth segments white or rose-colored; pedicels 5 mm. long or more.
17. E. esmeraldense.
Leaves with rounded or cordate base.
Leaves reniform or cordate-orbicular.
Leaves ciliate, green above, pubescent and reddish beneath; perianth yellow---18. E. rubricaule.
Leaves tomentose (at least beneath); perianth rose-colored.
19. E. subreniforme.
Leaves with rounded base.
Leaves green, glabrous or pubescent; pedicels erect or spreading. Perianth white or pinkish---16. E. gordoni.
Leaves more or less tomentose (at least beneath); pedicels deflexed.
Perianth segments similar, yellow---15. E. pusillum.
Perianth segments dissimilar, white, pinkish, or yellow, with red veins.
Perianth yellow, with reddish veins---14. E. wetherilli.
Perianth white or pinkish.
Pedicels 5 to 12 mm. long; branches and flowers numerous---13. E. cernuum.
Pedicels sometimes 24 mm. long; branches and involucres few---13a. E. cernuum tenue.

Subgenus 2. Oregonium

Plants annual, commonly with leafless stems. Involucres sessile, except those of the forks of the inflorescence, more or less racemose or solitary.
Branches incurved from the very base, forming a dense mass. Involucre turbinate; perianth yellowish; leaves orbicular or reniform.
27. E. nidularium.
Branches few to numerous, not forming a dense mass.
Stems fistulous. Leaves orbicular or reniform, pubescent; involucre turbinate, glandular----33. E. lemmoni.
Stems not fistulous.
Involucres campanulate.
Leaf blades ovate or oblong, tomentose; perianth rose-colored, pubescent----30. E. densum.
Leaf blades orbicular, tomentose; perianth white, glandular.
31. E. commixtum.
Involucres cylindric-turbinate.
Perianth densely pubescent, rose-colored; leaves roundish, tomentose (at least beneath)----32. E. dasyanthemum.
Perianth glabrous; leaves tomentose.
Involucre about 2 mm. long; leaf blades orbicular or ovate.
29. E. baileyi.
Involucre about 3 mm. long; leaf blades orbicular or reniform.
28. E. vimineum.
Plants perennial.
Inflorescence commonly capitate or of umbel-like clusters.
Perianth segments unequal. Plants scapose or nearly so, more or less matted.
Perianth rose-colored. Involucre tomentose, not angled.
69. E. rhodanthum.
Perianth yellow or ochroleucous (often turning purplish in age).
Involucres 6 to 7 mm. long, floccose, angled. Perianth ochroleucous.
73. E. orthocaulon.
Involucres 4 to 5 mm. long (5 to 7 mm. in No. 71).
Inflorescence cymose-proliferous, the central heads sessile.
72. E. proliferum.
Inflorescence of solitary heads.
Leaf blades broadly oval to suborbicular.
Leaf blades with conspicuous brown margin---71. E. eximium.
Leaf blades without brown margin----70. E. ovalifolium.
Leaf blades elliptic to spatulate----68. E. ochroleucum.
Perianth segments equal or nearly so.
Flowering stems leafy. Undershrubs, 30 to 60 cm. high; leaves fascicled, oblanceolate; rays divaricate; perianth campanulate, pubescent.
58. E. polifolium.
Flowering stems scapose or nearly so.
Perianth pubescent or villous.
Scape very short or wanting. Perianth yellow, 2 to 2.5 mm. long; leaves subsessile, strongly revolute----74. E. acaule.
Scape 2 cm. long or more. Heads of flowers 8 to 10 mm. in diameter; leaves small, villous or tomentose.
Ovary and fruit glabrous; leaves lanceolate, less than 2 mm. broad----61. E. villiflorum.

Ovary and fruit pubescent or tomentose; leaves spatulate or oblanceolate, not strongly revolute.
Perianth yellow; lobes of the involucre at least twice longer than the tube----------76. E. longilobum.
Perianth white or reddish; lobes of the involucre not twice longer than the tube----------75. E. shockleyi.
Perianth glabrous.
Leaves linear or nearly so. Heads of flowers subspicate; depressed undershrubs----------62. E. bicolor.
Leaves broader.
Scapes 2 to 4 cm. high, glandular----------63. E. rosense.
Scapes 4 cm. high or more.
Leaves suborbicular----------67. E. anemophilum.
Leaves obovate to spatulate. Perianth yellow.
Leaves 0.5 to 2 cm. long, tomentose----------66. E. kingii.
Leaves 3 to 10 cm. long. Perianth yellow.
Leaves linear-oblanceolate, floccose above, tomentose beneath----------64. E. chrysocephalum.
Leaves oblanceolate, tomentose on both faces.
65. E. ochrocephalum.
Inflorescence racemose, dichotomous or trichotomous.
Flowering stems not leafy.
Inflorescence racemose. Perianth pink or white; leaves long-petioled, tomentose (at least beneath), the blades elliptic or oblong, cordate, 2 to 6 cm. long----------39. E. racemosum.
Inflorescence dichotomous or trichotomous or of open cymes.
Leaves grayish-pubescent, the blades ovate-oblong, 5 to 20 cm. long, long-petioled, cordate to rounded. Stems 30 to 100 cm. high, glabrous or villous----------59. E. elatum.
Leaves tomentose (at least beneath).
Leaf blades ovate or oblong, obtuse, cordate or abruptly acute at base, glabrate above. Plant 30 to 100 cm. high--60. E. nudum.
Leaf blades linear-oblanceolate to elliptic-oblong, the base acute or cuneate.
Leaves linear-oblanceolate, short-petioled. Stems 10 to 25 cm. high; involucre campanulate, glabrous-----52. E. nudicaule.
Leaves narrowly spatulate, elliptic, or oblong.
Involucres broadly campanulate, glabrous, scarious-toothed.
Leaves narrowly elliptic; perianth white; plant 7 to 15 cm. high----------51. E. grangerense.
Involucres turbinate, glabrous or floccose. Perianth white or rose-colored.
Plant 10 to 20 cm. high; leaf blades floccose above.
54. E. ostlundi.
Plants 30 cm. high or more; leaf blades tomentose on both faces.
Leaf blades elliptic----------55. E. batemani.
Leaf blades spatulate----------56. E. spathulatum.
Flowering stems leafy (often only near the base).
Branches grooved. Plant diffusely and intricately branched; leaves oblanceolate or oblong, about 1 cm. long; involucres racemose.
40. E. sulcatum.

Branches not grooved.
Involucres racemose or apparently so on the branches or branchlets.
Leaves more or less tomentose; perianth pink or white.
Plants not cespitose, 30 to 80 cm. high; branches numerous, dichotomous or trichotomous.
Leaves linear or linear-oblong, sessile or short-petioled.
37. E. leptocladon.
Leaves oval or ovate, petioled. Branches divaricate; involucres numerous 34. E. plumatella.
Plants more or less cespitose. Involucres scattered toward the ends of the branches.
Leaves obovate to oblanceolate, acute, 4 to 20 mm. long.
36. E. wrightii.
Leaves oblong, involute, 10 mm. long or less.
36a. E. wrightii subscaposum.
Involucres in cymes, umbel-like clusters, or panicles.
Fruit winged. Leaves 4 to 15 cm. long, oblanceolate; plants 50 to 100 cm. high; involucres in small cymes.
Involucre, stem, and leaves more or less hairy; perianth greenish 77. E. alatum.
Involucre, stem, and leaves glabrous or nearly so; perianth brownish red 78. E. triste.
Fruit merely angled.
Leaves 3 cm. long or more, linear, tomentose (at least beneath).
Perianth yellow; involucre campanulate 57. E. campanulatum.
Perianth white or rose-colored; involucre turbinate.
53. E. lonchophyllum.
Leaves 1 to 5 cm. long, linear-lanceolate to rotund, or small and linear.
Leaves linear, 2 cm. long or less, revolute. Involucre turbinate; perianth white, ribbed with red.
Leaves blunt, more or less tomentose all over.
43. E. friscanum.
Leaves pointed, glabrous or nearly so above, tomentose beneath.
Perianth turbinate, 2 mm. long 42. E. simpsoni.
Perianth urceolate, 3.5 mm. long 41. E. clavellatum.
Leaves linear-lanceolate to orbicular.
Inflorescence ample, forming nearly half the height of the plant. Leaves elliptic, the blades 1 cm. broad or more; plant 30 cm. high or more, tomentose; perianth white or rose-colored 38. E. kearneyi.
Inflorescence smaller, forming less than one-third the plant.
Leaves orbicular or nearly so, about 1 cm. long, short-petioled. Plant more or less tomentose; perianth reddish 48. E. nummulare.
Leaves narrowly oblong or oblanceolate to ovate or elliptic.
Leaf blades ovate or broadly elliptic, tomentose beneath.
Involucres tomentose; perianth white or pinkish.
47. E. jonesii.
Involucres glabrous; perianth yellow.
Stem leaves numerous; inflorescence dense.
49. E. aureum.

Stem leaves few, near the base; inflorescence open.
50. E. thompsonae.
Leaf blades linear-oblanceolate to oblanceolate or elliptic.
Branches rigid, divaricate, dichotomously or trichotomously forked. Leaves glabrous, oblanceolate, 1 to 3 cm. long 35. E. heermanni.
Branches not divaricate.
Leaf blades oblong to elliptic, crisp-margined, 2 to 3 cm. long, tomentose beneath. Perianth white or rose-colored; plant 40 to 60 cm. high.
46. E. corymbosum.
Leaf blades narrowly oblong or oblanceolate, tomentose beneath.
Perianth yellow. Leaves about 1 cm. long.
44. E. microthecum.
Perianth rose-colored or white.
Leaves 3 cm. long or more; branches and internodes of the inflorescence long.
45. E. effusum.
Leaves 1 to 2 cm. long; branches and internodes of the inflorescence short.
44. E. microthecum.

Subgenus 3. Eueriogonum

Perianth pubescent.
Plants densely matted. Inflorescence capitate.
Peduncles bearing a medial whorl of bracts; leaves oblanceolate, 10 mm. long or more, white-tomentose 91. E. douglasii.
Peduncles not bracted; leaves oblong-lanceolate or oblong, 5 to 8 mm. long, white-tomentose.
Peduncles (full-grown) 1 to 4 cm. long; leaves oblanceolate to spatulate.
89. E. andinum.
Peduncles (full-grown) 8 to 15 cm. long; leaves oval to elliptic.
90. E. caespitosum.
Plants more or less cespitose, but not matted.
Inflorescence capitate, naked. Leaves linear-oblanceolate, 5 to 15 mm. long; plant silky white 92. E. sericoleucum.
Inflorescence capitate, of simple umbels or cymes. Stems with a whorl of leaves or bracts.
Leaves narrowly oblong-lanceolate or oblanceolate, 10 to 20 cm. long, white-tomentose 94. E. sphaerocephalum.
Leaves oblong-elliptic, the radical on long petioles, sparingly pubescent above, tomentose beneath, the blades 8 to 12 mm. broad. Involucre 8 to 10 mm. long 93. E. arcuatum.
Perianth glabrous.
Flowers capitate.
Leaves tomentose, the blades suborbicular or broadly ovate, 5 to 10 mm. long.
Plant compact; rays 4 to 12 mm. long; perianth yellow.
86. E. incanum.
Plant loose; rays 12 to 60 mm. long; perianth reddish, rarely yellow.
87. E. marifolium.
Leaves pubescent or glabrous, rhomboidal or ovate, the blades about 10 mm. long; perianth yellow 88. E. porteri.

Flowers in umbels.
Flowers red, rarely yellow, small. Leaves tomentose, the blades suborbicular or broadly ovate, 5 to 10 mm. long_____87. E. marifolium.
Flowers yellow or ochroleucous.
Stem with a whorl of leaves near the middle. Leaves narrowly oblong-lanceolate or oblanceolate, white-tomentose beneath, 2 to 5 cm. long; plant 20 to 40 cm. high_____79. E. heracleoides.
Stems without a medial whorl of leaves.
Leaves glabrous or sparingly floccose, broadly obovate to elliptic, the blades 10 to 30 mm. long.
Leaves on slender petioles, nearly equaling the blades.
84. E. neglectum.
Leaves mostly with very short petioles_____85. E. azaleastrum.
Leaves pubescent or tomentose, at least beneath.
Umbels compound. Leaves obovate to elliptic, pubescent to tomentose, the blades 10 to 20 mm. long_____83. E. stellatum.
Umbels simple (compound in No. 96).
Pedicels short, rarely 10 mm. long. Stem trichotomously branched from a deep root; bark dark brown; leaves oblanceolate, tomentose, the blades 10 to 15 mm. long__85. E. azaleastrum.
Pedicels more or less elongate. Leaves oblong-elliptic, often long-petioled, the blades 10 to 20 mm. long.
Perianth deep yellow_____82. E. umbellatum.
Perianth cream-colored, in age purplish or rose-colored.
Leaves glabrous above_____81. E. subalpinum.
Leaves pubescent or tomentose on both sides.
Leaf blades oblong-elliptic, about 1 cm. long, long-petioled.
Plant floccose to glabrate_____80. E. aridum.
Leaf blades ovate or rhombic, 2 to 4 cm. long.
Plant floccose; leaf blades tomentose beneath.
95. E. lobbii.
Plant densely white-tomentose; leaf blades tomentose all over_____96. E. robustum.

1. **Eriogonum angulosum** Benth. Trans. Linn. Soc. Bot. **17**: 406. 1837.
Desert areas and hillsides of the Covillea and artemisia belts. Washington to Lower California, Arizona, and western Utah.

1a. **Eriogonum angulosum maculatum** (Heller) Jepson, Fl. Calif. 405. 1914.
Eriogonum maculatum Heller, Muhlenbergia **2**: 188. 1906.
Desert areas and hillsides of the Covillea and artemisia belts. Nevada and southeastern California.

2. **Eriogonum puberulum** S. Wats. Proc. Amer. Acad. **14**: 295. 1879.
Plains and hillsides of the artemisia and pinyon belts. Utah.

3. **Eriogonum divaricatum** Hook. Journ. Bot. Kew Misc. **5**: 265. 1853.
Canyons and hillsides of the artemisia belt. Southeastern Utah.

4. **Eriogonum spergulinum** A. Gray, Proc. Amer. Acad. **7**: 389. 1868.
Mountain sides of the yellow pine and aspen belts; Sierra Nevada. California and western Nevada.

5. **Eriogonum pharnaceoides** Torr. in Sitgreaves, Rep. Zuñi & Colo. 167. *pl. 11*. 1854.
Rocky slopes of the pinyon and yellow pine belts. New Mexico, Arizona, and southern Utah.

6. Eriogonum salsuginosum (Nutt.) Hook. Journ. Bot. Kew Misc. **5**: 264. 1853.

Stenogonum salsuginosum Nutt. Journ. Acad. Phila. II. **1**: 170. 1848.

Foothills and canyons of the artemisia and pinyon belts. Wyoming to New Mexico and eastern Utah.

7. Eriogonum deflexum Torr. in Ives, Rep. Colo. Riv. 24. 1860.

Eriogonum insigne S. Wats. Proc. Amer. Acad. **14**: 295. 1879.

Desert areas and hillsides of the Covillea and artemisia belts. Southwestern Utah and Nevada to Arizona and California.

8. Eriogonum hookeri S. Wats. Proc. Amer. Acad. **14**: 295. 1879.

Plains and foothills of the artemisia and pinyon belts. Utah and Nevada.

9. Eriogonum brachypodum Torr. & Gray, Proc. Amer. Acad. **8**: 180. 1870.

Moist alkaline places of the Covillea and artemisia belts. Southeastern California and Nevada.

10. Eriogonum parryi A. Gray, Proc. Amer. Acad. **10**: 77. 1874.

Desert areas and hillsides of the Covillea belt. Southwestern Utah, Arizona, and southern California.

11. Eriogonum thomasii Torr. U. S. Rep. Expl. Miss. Pacif. **5**: 364. 1857.

On desert areas and canyons of the Covillea belt. Southwestern Utah and Arizona to southern California.

12. Eriogonum watsoni Torr. & Gray, Proc. Amer. Acad. **8**: 182. 1870.

Desert areas and hillsides of the Covillea and artemisia belts. Nevada and California.

13. Eriogonum cernuum Nutt. Journ. Acad. Phila. II. **1**: 162. 1848.

Plains, foothills, and canyons, upward to the spruce belt. Montana and Idaho, southward to New Mexico and Nevada.

13a. Eriogonum cernuum tenue Torr. & Gray, Proc. Amer. Acad. **8**: 182. 1870.

Foothills of the artemisia and pinyon belts. Utah and Nevada.

14. Eriogonum wetherillii Eastw. Proc. Calif. Acad. II. **6**: 319. 1896.

Canyons of the Colorado, Grand, and San Juan Rivers, Utah.

15. Eriogonum pusillum Torr. & Gray, Proc. Amer. Acad. **8**: 184. 1870.

Desert areas and hillsides of the Covillea, artemisia, and pinyon belts. Western Utah to southeastern California.

16. Eriogonum gordoni Benth. in DC. Prodr. **14**: 20. 1856.

Desert areas and hillsides of the artemisia and pinyon belts. Wyoming, Colorado, and eastern Utah.

17. Eriogonum esmeraldense S. Wats. Proc. Amer. Acad. **24**: 85. 1889.

Gravelly slopes of the artemisia and pinyon belts. Nevada.

18. Eriogonum rubricaule Tidestrom, Proc. Biol. Soc. Washington **36**: 181. 1923.

Dry rocky hillsides near Lahontan, Churchill County, Nevada.

19. Eriogonum subreniforme S. Wats. Proc. Amer. Acad. **12**: 260. 1877.

Hillsides of the Covillea and artemisia belts. New Mexico, southern Utah, Arizona, and Nevada.

20. Eriogonum nutans Torr. & Gray, Proc. Amer. Acad. **8**: 181. 1870.

Plains, foothills, and canyons of the artemisia and pinyon belts. Western Utah to California.

21. Eriogonum glandulosum Nutt.; Benth. in DC. Prodr. **14**: 21. 1856.

Eriogonum flexum Jones, Zoe **2**: 15. 1891.

Eriogonum flexum ferronis Jones, Contr. West. Bot. **11**: 15. 1903.

Plains and mountain sides of the artemisia and pinyon belts. Colorado and Utah.

22. Eriogonum ordii S. Wats. Proc. Amer. Acad. **21**: 468. 1886.

Desert areas of the Covillea belt. Southern California and Arizona to Utah.

23. Eriogonum trichopes Torr. in Emory, Mil. Reconn. 150. 1848.

Desert areas and hillsides of the Covillea and artemisia belts. Utah, Arizona, and southern California.

24. Eriogonum reniforme Torr. in Frém. Rep. Exped. Rocky Mount. 317. 1845.

?*Eriogonum collinum* Stokes; Jones, Contr. West. Bot. **11**: 15. 1903

Eriogonum reniforme asarifolium Gandog. Bull. Soc. Bot. Belg. **42**: 196. 1906.

Eriogonum praebens Gandog. Bull. Soc. Bot. Belg. **42**: 196. 1906.

Desert areas and hillsides of the Covillea and artemisia belts. Southwestern Utah, Nevada, Arizona, and California.

25. Eriogonum inflatum Torr. in Frém. Rep. Exped. Rocky Mount. 317. 1845.

Eriogonum fusiforme Small, Bull. Torrey Club **33**: 56. 1906.

Desert areas and hillsides of the artemisia and pinyon belts. Colorado and New Mexico to California.

26. Eriogonum tenellum Torr. Ann. Lyc. N. Y. **2**: 241. 1827.

Rocky canyons of the artemisia belt. Colorado and Utah to western Texas and Mexico.

27. Eriogonum nidularium Coville, Contr. U. S. Nat. Herb. **4**: 186. 1893.

Eriogonum nidularium luciense Jones, Contr. West. Bot. **11**: 17. 1903.

Desert areas and hillsides of the Covillea and artemisia belts. Southern Oregon and Idaho to Nevada and California.

28. Eriogonum vimineum Dougl.; Benth. Trans. Linn. Soc. Bot. **17**: 416. 1837.

Eriogonum leucocladum Gandog. Soc. Bot. Belg. **42**: 189. 1906.

Plains and foothills of the artemisia belt. Washington and Idaho, southward to southwestern Utah and California.

29. Eriogonum baileyi S. Wats. Proc. Amer. Acad. **10**: 348. 1875.

Plains and foothills of the artemisia belt. Arizona and California to Washington.

30. Eriogonum densum Greene, Pittonia **3**: 17. 1896.

Canyons and hillsides of the artemisia belt. New Mexico and Arizona to Nevada.

31. Eriogonum commixtum Greene; Tidestrom, Proc. Biol. Soc. Washington **36**: 181. 1923.

Valleys and hillsides of the artemisia belt. Nevada.

32. Eriogonum dasyanthemum Torr. & Gray, Proc. Amer. Acad. **8**: 177. 1870.

Virginia City, Nevada. California and Nevada.

33. Eriogonum lemmoni S. Wats. Proc. Amer. Acad. **12**: 266. 1877.

Sandhills of the artemisia belt. Western Nevada.

34. Eriogonum plumatella Dur. & Hilg. U. S. Rep. Expl. Miss. Pacif. **5**: 14. 1855.

Eriogonum palmeri S. Wats. Proc. Amer. Acad. **12**: 267. 1877.

Desert areas and hillsides of the Covillea belt. Southern Utah, Nevada, and southern California.

35. Eriogonum heermanni Dur. & Hilg. U. S. Rep. Expl. Miss. Pacif. 5: 14. 1855.

Desert areas and hillsides of the artemisia belt. Nevada and southern California.

36. Eriogonum wrightii Torr.; Benth. in DC. Prodr. 14: 15. 1856.

Valleys and mountain sides of the artemisia and pinyon belts. Colorado to California, southward to Texas and Mexico.

36a. Eriogonum wrightii subcaposum S. Wats. Bot. Calif. 2: 29. 1880.

Foothills and mountain sides of the artemisia, pinyon, and yellow pine belts. California and Nevada.

37. Eriogonum leptocladon Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. 2: 129. 1855.

Eriogonum ramosissimum Eastw. Proc. Calif. Acad. II. 6: 322. 1896.

Eriogonum eastwoodae Jones, Contr. West. Bot. 11: 13. 1903.

Artemisia belt; southeastern Utah. Utah and New Mexico.

38. Eriogonum kearneyi Tidestrom, Proc. Biol. Soc. Washington 26: 122. 1913.

Sandhills of the artemisia belt. Utah.

39. Eriogonum racemosum Nutt. Journ. Acad. Phila. II. 1: 161. 1848.

Eriogonum orthocladon Torr. in Sitgreaves, Rep. Zuñi & Colo. 167. *pl. 9.* 1854.

Canyons and mountain sides of the artemisia belt, upward to the spruce belt. Colorado to Texas, Arizona and Nevada.

40. Eriogonum sulcatum S. Wats. Proc. Amer. Acad. 14: 296. 1879.

Rocky places of the artemisia and pinyon belts. Southern Utah, Arizona, and Nevada.

41. Eriogonum clavellatum Small, Bull. Torrey Club 25: 48. 1898.

Hillsides of the artemisia belt. Southeastern Utah.

42. Eriogonum simpsoni Benth. in DC. Prodr. 14: 18. 1856.

Eriogonum microthecum leptophyllum Torr. & Gray, Proc. Amer. Acad. 8: 171. 1870.

Plains and foothills of the artemisia and pinyon belts. Colorado and New Mexico to Nevada.

43. Eriogonum friscanum Jones, Contr. West. Bot. 11: 14. 1903.

Artemisia and pinyon belts. Utah.

44. Eriogonum microthecum Nutt. Journ. Acad. Phila. II. 1: 162. 1848.

Plains and foothills of the artemisia belt, upward to the spruce belt. Montana to Washington, southward to Colorado and California.

45. Eriogonum effusum Nutt. Journ. Acad. Phila. II. 1: 164. 1848.

Plains and hillsides of the artemisia and pinyon belts. Nebraska to Montana, New Mexico, and Utah.

46. Eriogonum corymbosum Benth. in DC. Prodr. 14: 17. 1856.

Plains and foothills of the artemisia and pinyon belts. Colorado and northern New Mexico to Nevada.

47. Eriogonum jonesii S. Wats. Proc. Amer. Acad. 21: 454. 1886.

Plains and hillsides of the artemisia and pinyon belts. Utah and Arizona.

48. Eriogonum nummulare Jones, Contr. West. Bot. 11: 13. 1903.

Artemisia and pinyon belts. Utah.

49. Eriogonum aureum Jones, Proc. Calif. Acad. II. 5: 718. 1895.

Covillea and artemisia belts. Southern Utah.

50. Eriogonum thompsonae S. Wats. Amer. Nat. **7**: 302. 1873.
Sand cliffs of the artemisia belt. Southern Utah.

51. Eriogonum grangerense Jones, Contr. West. Bot. **11**: 12. 1903.
Barren hills. Wyoming and Utah (?).

52. Eriogonum nudicaule (Torr.) Small, Bull. Torrey Club **33**: 54. 1906.
Eriogonum effusum nudicaule Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 132. 1857.
Plains and hillsides of the artemisia and pinyon belts. Kansas and Texas to Utah.

53. Eriogonum lonchophyllum Torr. & Gray, Proc. Amer. Acad. **8**: 173. 1870.
Artemisia and pinyon belts. Colorado, Utah (?), and northern New Mexico.

54. Eriogonum ostlundi Jones, Contr. West. Bot. **11**: 12. 1903.
Artemisia and pinyon belts. Utah.

55. Eriogonum batemani Jones, Contr. West. Bot. **11**: 11. 1903.
Eriogonum spathuliforme Rydb. Bull. Torrey Club **39**: 307. 1912.
Artemisia belt. Utah.

56. Eriogonum spathulatum A. Gray, Proc. Amer. Acad. **10**: 76. 1874.
Artemisia and pinyon belts. Southern Utah.

57. Eriogonum campanulatum Nutt. Journ. Acad. Phila. II. **1**: 163. 1848.
Eriogonum brevicaule Nutt. Journ. Acad. Phila. II. **1**: 164. 1848.
Eriogonum micranthum Nutt. Journ. Acad. Phila. II. **1**: 164. 1848.
Plains and hillsides of the artemisia and pinyon belts. Nebraska, westward to Montana, Utah, and Idaho.

58. Eriogonum polifolium Benth. in DC. Prodr. **14**: 12. 1856.
Eriogonum revolutum Goodding, Bot. Gaz. **37**: 54. 1904.
Desert areas and mountain sides of the Covillea belt. Southern Utah, Arizona, and southern California.

59. Eriogonum elatum Dougl.; Benth. Trans. Linn. Soc. Bot. **17**: 413. 1837.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Idaho to Washington, southward to Nevada and California.

60. Eriogonum nudum Dougl.; Benth. Trans. Linn. Soc. Bot. **17**: 413. 1837.
Eriogonum deductum Greene, Pittonia **5**: 71. 1902.
Plains and mountain sides, upward to the spruce belt. Washington to California and Nevada.

61. Eriogonum villiflorum A. Gray, Proc. Amer. Acad. **8**: 630. 1873.
Plains and hillsides of the artemisia belt. Southern Utah.

62. Eriogonum bicolor Jones, Zoe **4**: 261. 1893.
Desert areas; Price, Utah.

63. Eriogonum rosense Nels. & Kenn. Proc. Biol. Soc. Washington **19**: 36. 1906.
Subalpine belt; Sierra Nevada. Nevada and California.

64. Eriogonum chrysocephalum A. Gray, Proc. Amer. Acad. **11**: 101. 1876.
Eriogonum medium Rydb. Fl. Rocky Mount. 220, 1061. 1917.
Yellow pine, aspen, and spruce belts. Nebraska to Utah and Idaho.

65. Eriogonum ochrocephalum S. Wats. Bot. Calif. **2**: 480. 1880.
Eriogonum ochrocephalum angustum Jones, Contr. West. Bot. **11**: 9. 1903.
Plains and hillsides of the artemisia belt. Oregon and Nevada.

66. Eriogonum kingii Torr. & Gray, Proc. Amer. Acad. **8**: 165. 1870.
Eriogonum loganum A. Nels. Bot. Gaz. **54**: 149. 1912.
Spruce belt. Utah, Idaho, and Nevada.

67. Eriogonum anemophilum Greene, Pittonia **3**: 199. 1899.

Spruce belt. Nevada.

68. Eriogonum ochroleucum Small, Mem. N. Y. Bot. Gard. **1**: 123. 1900.

Artemisia, pinyon, and yellow pine belts. Montana to Colorado, Nevada, and Idaho.

69. Eriogonum rhodanthum Nels. & Kenn. Proc. Biol. Soc. Washington **19**: 35. 1906.

Subalpine belt. Nevada.

70. Eriogonum ovalifolium Nutt. Journ. Acad. Phila. **7**: 50. 1834.

Eriogonum ovalifolium nevadense Gandog. Bull. Soc. Bot. Belg. **42**: 193. 1906.

Eriogonum ovalifolium utahense Gandog. Bull. Soc. Bot. Belg. **42**: 194. 1906.

Plains and mountain sides of the artemisia belt, upward to the spruce belt. Alberta to Washington, southward to New Mexico and Arizona.

71. Eriogonum eximium Tidestrom, Proc. Biol. Soc. Washington **36**: 181. 1923.

Yellow pine, aspen, and spruce belts; Sierra Nevada. Western Nevada and California.

72. Eriogonum proliferum Torr. & Gray, Proc. Amer. Acad. **8**: 164. 1870.

?*Eriogonum anserinum* Greene, Pittonia **4**: 320. 1901.

?*Eriogonum cusickii californicum* Gandog. Bull. Soc. Bot. Belg. **42**: 193. 1906.

Dry mountain sides of the artemisia, pinyon, and yellow pine belts. Idaho and Washington to Nevada and California.

73. Eriogonum orthocaulon Small, Bull. Torrey Club **33**: 53. 1906.

Plains and hillsides of the artemisia belt. Alberta to Colorado, Utah, and Nevada.

74. Eriogonum acaule Nutt. Journ. Acad. Phila. II. **1**: 160. 1848.

Foothills and canyons, upward to the aspen belt. Wyoming to Colorado, Idaho, and Nevada.

75. Eriogonum shockleyi S. Wats. Proc. Amer. Acad. **18**: 194. 1883.

Eriogonum pulvinatum Small, Bull. Torrey Club **25**: 44. 1898.

Desert areas and rocky hillsides of the Covillea and artemisia belts. Southern Utah and Nevada.

76. Eriogonum longilobum Jones, Proc. Calif. Acad. II. **5**: 720. 1895.

Desert areas and hillsides of the artemisia and pinyon belts. Utah and Nevada.

77. Eriogonum alatum Torr. in Sitgreaves, Rep. Zuñi & Colo. 168. *pl.* 8. 1854.

Plains and mountain sides of the artemisia belt, upward to the spruce belt. Nebraska to Texas, westward to Wyoming and Arizona.

78. Eriogonum triste S. Wats. Proc. Amer. Acad. **10**: 347. 1875.

Sandhills and mountain sides of the artemisia, pinyon, and yellow pine belts. Southern Colorado and Utah to Arizona and Texas.

79. Eriogonum heracleoides Nutt. Journ. Acad. Phila. **7**: 49. 1834.

Yellow pine, aspen, and spruce belts. British Columbia to Utah and Nevada.

80. Eriogonum aridum Greene, Pittonia **3**: 200. 1897.

Eriogonum reclinatum Greene, Pittonia **5**: 67. 1902.

Desert areas and foothills of the artemisia, pinyon, and yellow pine belts. Montana to Washington, southward to Colorado and Nevada.

81. Eriogonum subalpinum Greene, Pittonia 3: 18. 1896.

Spruce and alpine belts. Alberta and British Columbia to Nevada and Colorado.

82. Eriogonum umbellatum Torr. Ann. Lyc. N. Y. 2: 241. 1828.

Valleys and mountain sides, upward to the subalpine belt. Wyoming and Colorado to California and Washington.

83. Eriogonum stellatum Benth. Trans. Linn. Soc. Bot. 17: 409. 1837.

Pinyon, yellow pine, aspen, and spruce belts. Washington to Utah, Nevada, and California.

84. Eriogonum neglectum Greene, Pittonia 5: 69. 1902.

Eriogonum umbelliferum Small, Bull. Torrey Club 33: 51. 1906.

Pinyon belt, upward to the subalpine belt. Wyoming and Colorado to Nevada.

85. Eriogonum azaleastrum Greene, Pittonia 5: 67. 1902.

Dry rocky slopes of the yellow pine, aspen, and spruce belts; Sierra Nevada. Nevada.

86. Eriogonum incanum Torr. & Gray, Proc. Amer. Acad. 8: 161. 1870.

Yellow pine belt, upward to the alpine belt. California and western Nevada.

87. Eriogonum marifolium Torr. & Gray, Proc. Amer. Acad. 8: 161. 1870.

Mountain sides of the yellow pine, aspen, and spruce belts. California and western Nevada.

88. Eriogonum porteri Small, Bull. Torrey Club 25: 41. 1898.

Spruce and alpine belts. Utah to Oregon and California.

89. Eriogonum andinum Nutt. Journ. Acad. Phila. II. 1: 160. 1848.

Plateaus and mountain sides of the yellow pine, aspen, and spruce belts. Montana and Wyoming, westward to Idaho and Nevada.

90. Eriogonum caespitosum Nutt. Journ. Acad. Phila. 7: 50. *pl. 8, f. 2.* 1834.

Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Wyoming and Utah to Oregon and California.

91. Eriogonum douglasii Benth. in DC. Prodr. 14: 9. 1856.

Mountain sides of the yellow pine belt. Washington to California and Nevada.

92. Eriogonum sericoleucum Greene; Tidestrom, Proc. Biol. Soc. Washington 36: 182. 1923.

Yellow pine and aspen belts; Sierra Nevada. Nevada.

93. Eriogonum arcuatum Greene, Pittonia 4: 319. 1901.

Eriogonum jamesii flavescens Benth. Proc. Amer. Acad. 12: 255. 1877.

Yellow pine, aspen, spruce, and subalpine belts. Wyoming to New Mexico, Utah, and Arizona.

94. Eriogonum sphaerocephalum Dougl.; Benth. Trans. Linn. Soc. Bot. 17: 407. 1837.

Artemisia belt. Idaho and Washington to California and Nevada.

95. Eriogonum lobbii Torr. & Gray, Proc. Amer. Acad. 8: 162. 1870.

Yellow pine, aspen, and spruce belts. California and western Nevada.

96. Eriogonum robustum Greene, Bull. Calif. Acad. 1: 126. 1885.

Mountain sides of the artemisia, pinyon, and yellow pine belts. Nevada.

5. PHYLLOGONUM Coville

1. **Phyllogonum luteolum** Coville, Contr. U. S. Nat. Herb. 4: 190. *pl. 21.* 1893.
Desert areas and canyons of the Covillea belt. Southeastern California and southern Nevada.

6. RUMEX L. Dock. Sorrel

Leaves hastate, oblong to linear-lanceolate, 3 to 15 cm. long, the uppermost linear, entire. Flowers dioecious; achenes granular; perennial 10 to 60 cm. high; rootstock creeping----------1. R. acetosella.
Leaves not hastate.
Flowers dioecious. Perennial 20 to 50 cm. high; leaf blades lanceolate or oblanceolate, the lower long-petioled, the upper sessile; perianth segments rounded, without tubercles----------2. R. paucifolius.
Flowers mostly perfect.
Inner perianth lobes (in fruit) spinulose or awn-toothed.
Plant low; flowering branches very leafy. Leaves linear-lanceolate, cordate or truncate; fruiting sepals ovate-acuminate, with obsolete teeth----------12. R. maritimus athrix.
Plants 0.4 to 1.5 meters high; flowering branches with few leaves.
Lower leaves cordate, ovate-oblong, 15 to 30 cm. long; perianth (in fruit) with 1 tubercle----------10. R. obtusifolius.
Leaves lanceolate to linear-lanceolate, 25 cm. long or less, undulate; perianth segments small, all bearing tubercles.
11. R. persicarioides.
Inner perianth lobes entire or denticulate.
Inner lobes bearing tubercles.
Leaves flat-margined, pale green, lanceolate to linear-lanceolate, 5 to 15 cm. long. Perianth lobes 5 to 6 mm. long, truncate at base; plant 30 to 60 cm. high----------9. R. mexicanus.
Leaves with crisped or undulate margin. Plants 30 to 150 cm. high.
Fruiting perianth lobes round-cordate, 6 to 7 mm. long, undulate, one bearing a tubercle; leaves ovate-lanceolate, 10 to 40 cm. long----------7. R. patientia.
Fruiting perianth lobes ovate to reniform, denticulate, all bearing tubercles; leaves oblong-lanceolate to linear-lanceolate, 15 to 30 cm. long----------8. R. crispus.
Inner lobes without tubercles.
Inner lobes in fruit 2 to 4 cm. long, cordate-orbicular. Leaves ovate to oblong-lanceolate, 3 to 12 cm. long; plant 15 to 40 cm. high, the stems decumbent----------3. R. venosus.
Inner lobes in fruit less than 1.5 cm. long.
Perianth lobes cordate-deltoid, acute or acuminate, 6 to 8 mm. long. Leaves elliptic to oblong-lanceolate, entire; plant 1 to 2 meters high----------6. R. subalpinus.
Perianth lobes obtuse.
Leaves elliptic or oblanceolate, mostly with an acute base, crisp-margined, 5 to 20 cm. long; perianth lobes cordate-rounded, 10 mm. long or more; plant 1 meter high or less.
4. R. hymenosepalus.
Leaves oblong-lanceolate, cordate or truncate, 10 to 30 cm. long; perianth lobes cordate, 5 to 6 mm. long; plant 2 meters high or less----------5. R. occidentalis.

1. Rumex acetosella L. Sp. Pl. 338. 1753.

About settlements, in canyons, and on hillsides; introduced from Europe. Throughout North America.

2. Rumex paucifolius Nutt. Journ. Acad. Phila. 7: 49. 1834.

Canyons and mountain parks of the yellow pine, aspen, and spruce belts. Alberta and British Columbia to California and Colorado.

3. Rumex venosus Pursh, Fl. Amer. Sept. 2: 733. 1814.

Wet sandy places on the plains, upward to the yellow pine belt. Saskatchewan to Missouri, westward to California and Washington.

4. Rumex hymenosepalus Torr. U. S. & Mex. Bound. Bot. 177. 1859.

CANAIGRE.

Plains and hillsides of the Covillea and artemisia belts. Oklahoma and Texas to Utah, California, and Mexico.

5. Rumex occidentalis S. Wats. Proc. Amer. Acad. 12: 253. 1877.

? *Rumex gracilipes* Greene, Pittonia 4: 304. 1901.

Meadows and canyons of the artemisia belt, upward to the spruce belt. Labrador to Alaska, southward to the Dakotas, New Mexico, and California.

6. Rumex subalpinus Jones, Proc. Calif. Acad. II. 5: 720. 1895.

Yellow pine, aspen, spruce, and subalpine belts. Colorado and Utah.

7. Rumex patientia L. Sp. Pl. 333. 1753. PATIENCE DOCK.

About settlements; introduced from Europe. Newfoundland to New Jersey and Utah.

8. Rumex crispus L. Sp. Pl. 335. 1753.

About settlements; introduced from Europe. Throughout the United States.

9. Rumex mexicanus Meisn. in DC. Prodr. 14: 45. 1856.

Wet places in valleys and canyons of the artemisia belt, upward to the spruce belt. Labrador to British Columbia, southward to Maine, Missouri, and Mexico.

10. Rumex obtusifolius L. Sp. Pl. 335. 1753.

About settlements; introduced from Europe. Nova Scotia to British Columbia, southward to Florida and New Mexico.

11. Rumex persicarioides L. Sp. Pl. 335. 1753.

Wet places in valleys and canyons and about lakes in the artemisia and pinyon belts. Quebec to Virginia, New Mexico, and California.

12. Rumex maritimus athrix St. John, Rhodora 17: 79. 1915.

Borders of saline ponds and low places among *Allenrolfea occidentalis*. Utah and Nevada.

7. OXYRIA Hill. MOUNTAIN-SORREL

1. Oxyria digyna (L.) Hill, Hort. Kew. 158. 1768.

Rumex digynus L. Sp. Pl. 337. 1753.

Spruce and alpine belts. Greenland to Alaska, southward to New England, New Mexico, and California; also in Europe and Asia.

8. POLYGONUM L.

Plants more or less suffrutescent, 5 to 15 cm. high, with numerous stems from a stout root. Leaves oblong or obovate, 1 cm. long or less; flowers axillary, campanulate, 3 to 4 mm. long ..... 1. P. shastense.

Plants slender annuals or perennials.
Inflorescence dense, at the ends of the branches. Leaves linear, 5 to 10 mm. long or more; plants low.
Perianth greenish white, the lobes not keeled; achenes brown, smooth. 11. P. kelloggii.
Perianth pink or rose-colored, the lobes keeled; achenes dark brown or black, striate 12. P. watsoni.
Inflorescence not dense, the flowers in axillary clusters or in loose bracted racemes.
Leaves obovate to elliptic, 5 to 15 mm. long. Perianth greenish white; achenes black, shining; plants 5 to 15 cm. high.
Leaves ovate to elliptic; fruit erect, acute 4. P. minimum.
Leaves obovate; fruit reflexed 7. P. austinae.
Leaves oblong to linear.
Plants prostrate. Branches leafy to the ends.
Leaves oblong to oblanceolate, mostly obtuse, 5 to 15 mm. long; achenes granular, indistinctly striate 2. P. buxiforme.
Leaves oblong-lanceolate, acute, 10 to 30 mm. long; achenes rugulose-striate 3. P. aviculare.
Plants erect.
Fruit erect.
Upper bracts subulate; perianth segments green, with lighter margin; achenes smooth, shining; plants 5 to 30 cm. high; leaves oblanceolate, 1 to 2 cm. long 5. P. sawatchense.
Upper bracts not subulate; perianth segments with yellowish margins; achenes dull black; plant 20 to 100 cm. high; leaves lanceolate to linear-oblong, 1 to 4 cm. long. 6. P. ramosissimum.
Fruit reflexed.
Upper bracts foliaceous; achenes black, shining, striate. Leaves oblong to oblanceolate, 1 to 3 cm. long; perianth segments whitish, with reddish margins; plants 10 to 30 cm. high. 8. P. montanum.
Upper bracts reduced, subulate; achenes black, shining, smooth.
Perianth 2.5 mm. long or less; plants 5 to 30 cm. high; leaves linear 9. P. engelmannii.
Perianth 3 to 5 mm. long, white or with rose-colored margin; plants 20 to 40 cm. high; leaves linear to oblanceolate. 10. P. douglasii.

1. Polygonum shastense Brewer; A. Gray, Proc. Amer. Acad. **8**: 400. 1872.

Yellow pine, aspen, and spruce belts; Sierra Nevada. California, Nevada, and Oregon.

2. Plygonum buxiforme Small, Bull. Torrey Club **33**: 56. 1906.

Plains and canyons, upward to the spruce belt. Ontario to Virginia, westward to British Columbia and California.

3. Polygonum aviculare L. Sp. Pl. 362. 1753. KNOTGRASS.

Waste ground; Wyoming and westward. Introduced from the Old World. Newfoundland to Virginia, New Mexico, and California.

4. Polygonum minimum S. Wats. in King, Geol. Expl. 40th Par. **5**: 315. 1871.

Aspen and spruce belts. Alaska to Utah and California.

5. Polygonum sawatchense Small, Bull. Torrey Club **20**: 213. 1893.

Aspen and spruce belts. South Dakota to New Mexico, westward to Washington and California.

6. Polygonum ramosissimum Michx. Fl. Bor. Amer. **1**: 237. 1803.

Valleys and canyons, upward to 2,700 meters. Manitoba to Illinois, Nevada, and British Columbia.

7. Polygonum austinae Greene, Bull. Calif. Acad. **1**: 212. 1885.

Aspen and spruce belts. British Columbia to Wyoming, Nevada, and California.

8. Polygonum montanum (Small) Greene, Pl. Baker. **3**: 13. 1901.

Polygonum tenue latifolium Engelm. Proc. Acad. Phila. **1863**: 75. 1864.

Polygonum douglasii montanum Small, Mem. Bot. Columb. Coll. **1**: 118. 1895.

Aspen belt, upward to 3,400 meters. Alberta to New Mexico and California.

9. Polygonum engelmannii Greene, Bull. Calif. Acad. **1**: 126. 1885.

Aspen and spruce belts. Montana to British Columbia, southward to Colorado and eastern Utah.

10. Polygonum douglasii Greene, Bull. Calif. Acad. **1**: 125. 1885.

Pinyon belt, upward to 3,400 meters. Vermont and New York, westward to British Columbia and California.

11. Polygonum kelloggii Greene, Fl. Franc. 134. 1891.

Polygonum intricatum Nutt.; S. Wats. Amer. Nat. **7**: 665. 1873. Not *P. intricatum* Raf. 1836.

Aspen and spruce belts. British Columbia southward to Colorado and California.

12. Polygonum watsonii Small, Mem. Bot. Columb. Coll. **1**: 138. *pl. 56*. 1895.

Aspen and spruce belts. Saskatchewan to British Columbia, southward to Colorado and California.

9. ACONOGONUM Reichenb.

1. Aconogonum phytolaccaefolium (Meisn.) Small; Rydb. Fl. Rocky Mount. 238, 1061. 1917.

Polygonum polymorphum alpinum S. Wats. in King, Geol. Expl. 40th Par. **5**: 317. 1871.

Polygonum phytolaccaefolium Meisn.; Small, Bull. Torrey Club **19**: 360. 1892.

Meadows and open pine forests, at 2,100 to 2,700 meters. Alaska to Idaho, Nevada, and California.

10. BISTORTA Mill. BISTORT

Spikes linear, 2 to 10 cm. long, 1 cm. thick or less, viviparous. Leaves oblong to lanceolate, 2 to 10 cm. long; plants 4 to 30 cm. high__**1. B. vivipara.**

Spikes oblong, 1 to 2 cm. thick, not viviparous.

Basal leaves linear, acute, the blades 4 cm. long or more; spike 2 cm. long or less; perianth 3 to 4 mm. long, white; plants 10 to 30 cm. high.
2. B. linearifolia.

Basal leaves oblong, 10 to 25 cm. long, 1 to 3 cm. broad, obtuse or acute; spike 1 to 6 cm. long; perianth light rose-colored, 5 to 6 cm. long; plants 20 to 70 cm. high_____**3. B. bistortoides.**

1. **Bistorta vivipara** (L.) S. F. Gray, Nat. Arr. Brit. Pl. 2: 268. 1821.
Polygonum viviparum L. Sp. Pl. 360. 1753.
Spruce and alpine belts, in bogs. Greenland to Alaska, southward to New England, New Mexico, and California; also in Europe and Asia.

2. **Bistorta linearifolia** (S.Wats.) Greene, Leaflets 1: 18. 1904.
Polygonum bistorta linearifolium S. Wats. in King, Geol. Expl. 40th Par. 5: 317. 1871.
Spruce and alpine belts. Montana to Colorado, Utah, and Nevada.

3. **Bistorta bistortoides** (Pursh) Small, Bull. Torrey Club 33: 57. 1906.
Polygonum bistortoides Pursh, Fl. Amer. Sept. 1: 271. 1814.
Spruce and alpine belts. Montana to British Columbia, southward to New Mexico and California.

11. PERSICARIA Mill.

Racemes terminal, usually solitary.
- Leaves glabrous, the blades oblong or elliptic, 3 to 10 cm. long, obtuse.
  - Spike 1 to 3 cm. long; perianth rose-colored; achenes lenticular, black. **1. P. amphibia.**
- Leaves strigose or hispid. Perianth rose-colored; plants with stems 30 to 80 cm. long.
  - Ocreae without dilated foliaceous margins; spike linear or linear-oblong, 3 to 10 cm. long; achenes granular, black; leaves broadly lanceolate, 5 to 20 cm. long ..... **2. P. muhlenbergii.**
  - Ocreae with dilated foliaceous fringed margins; spike oblong or ovoid, 1 to 3 cm. long; achenes black, shining; leaves oblong-lanceolate, 6 to 18 cm. long ..... **3. P. hartwrightii.**

Racemes axillary and terminal.
- Ocreae without marginal bristles. Leaves broadly to narrowly lanceolate, acuminate, 5 to 20 cm. long; spikes linear-oblong, 2 to 8 cm. long, drooping; achenes 3-angled, black or nearly so; glabrous erect annual, 30 to 60 cm. high ..... **4. P. lapathifolia.**
- Ocreae with fringed margins.
  - Racemes oblong or cylindric, 5 to 10 mm. in diameter; perianth pink or purple, not glandular. Achenes lenticular or 3-angled, shining; erect annual, 30 to 80 cm. high, with linear-lanceolate to lanceolate, acuminate, punctate leaves, 2 to 18 cm. long ..... **5. P. maculosa.**

Racemes slender, interrupted; perianth glandular. Leaves punctate.
- Leaves lanceolate to ovate-lanceolate, 2 to 9 cm. long, acute, papillose; racemes drooping; achenes granular, dull brown; erect or ascending glabrous annual, 20 to 60 cm. high ..... **6. P. hydropiper.**
- Leaves linear-lanceolate to lanceolate, 5 to 15 cm. long, acuminate, conspicuously punctate; racemes erect; achenes smooth, black, shining; erect or creeping glabrous annual or perennial, 1 meter high or less ..... **7. P. punctata.**

1. **Persicaria amphibia** (L.) S. F. Gray, Nat. Arr. Brit. Pl. 2: 268. 1821.
Polygonum amphibium L. Sp. Pl. 361. 1753.
In water in valleys and canyons, upward to 2,700 meters. Quebec to New Jersey, New Mexico, and California; also in Europe and Asia.

2. **Persicaria muhlenbergii** (Meisn.) Small; Rydb. Colo. Agr. Exp. Sta. Bull. 100: 111. 1906.
Polygonum amphibium emersum Michx. Fl. Bor. Amer. 1: 240. 1803.
Polygonum amphibium muhlenbergii Meisn. in DC. Prodr. 14: 116. 1856.
In water in valleys and canyons, upward to 2,400 meters. North America.

3. Persicaria hartwrightii (A. Gray) Greene, Leaflets 1: 24. 1904.
Polygonum hartwrightii A. Gray, Proc. Amer. Acad. 8: 294. 1870.
In water in valleys and canyons, upward to 2,400 meters. Maine to Pennsylvania, westward to Saskatchewan, Washington, and California.

4. Persicaria lapathifolia (L.) S. F. Gray, Nat. Arr. Brit. Pl. 2: 270. 1821.
Polygonum lapathifolium L. Sp. Pl. 360. 1753.
Wet places in valleys and canyons, upward to 2,400 meters. Quebec to British Columbia, southward to West Indies and Mexico.

5. Persicaria maculosa S. F. Gray, Nat. Arr. Brit. Pl. 2: 270. 1821.
Polygonum persicaria L. Sp. Pl. 361. 1753.
Waste places about settlements; introduced from Europe. Newfoundland to British Columbia, southward to Florida and Mexico.

6. Persicaria hydropiper (L.) Opiz, Sezn. Rostl. Ceské 72. 1852.
Polygonum hydropiper L. Sp. Pl. 361. 1753.
About settlements; introduced from Europe. Newfoundland to British Columbia, southward to Mexico and Central America.

7. Persicaria punctata (Ell.) Small, Fl. Southeast. U. S. 379. 1903.
Polygonum punctatum Ell. Bot. S. C. & Ga. 1: 445. 1817.
Swamps and wet places in valleys. Massachusetts to California, southward to South America.

12. BILDERDYKIA Dum. Cornbind

Outer sepals keeled at maturity; leaves ovate-sagittate, 2 to 6 cm. long; achenes black, granular ..... 1. B. convolvulus.
Outer sepals with conspicuous wings at maturity; leaves ovate-cordate or oblong-cordate, 2 to 12 cm. long; achenes black, shining, smooth. ..... 2. B. scandens.

1. Bilderdykia convolvulus (L.) Dum. Fl. Belg. 18. 1827.
Polygonum convolvulus L. Sp. Pl. 364. 1753.
About settlements; introduced from Europe. Throughout North America except in the extreme north.

2. Bilderdykia scandens (L.) Greene, Leaflets 1: 23. 1904.
Polygonum scandens L. Sp. Pl. 364. 1753.
In fields. Nova Scotia to Florida, Texas, and British Columbia.

36. CHENOPODIACEAE. Goosefoot Family

Herbs or shrubs with alternate or opposite leaves without stipules; flowers small, greenish, solitary or in clusters, spikes, cymes, or panicles; calyx of 2 to 5 sepals; corolla wanting; stamens opposite the sepals; styles 2 to 5; ovary 1-celled; fruit a 1-seeded utricle.

Leaves scalelike. Flowers perfect, in axillary glomerules; stamens 1 or 2; succulent salt marsh herbs or shrubs with jointed stems or branches.
Branches, bracts, and scales alternate ..... 12. ALLENROLFEA.
Branches, bracts, and scales opposite ..... 13. SALICORNIA.
Leaves not scalelike.
Leaves opposite.
Flowers perfect, axillary, solitary, in clusters of 2 to 5 or in glomerules.
Perianth membranous.
Plants glabrous, perennial, 10 to 30 cm. high; leaves linear to oblong, acute, 5 to 25 mm. long ..... 1. NITROPHILA.

Plants pubescent; leaves linear, fleshy; our species perennials.
10. KOCHIA.

Flowers monoecious or dioecious, in axillary or terminal glomerules, spikes, or cymes.

Plants spinescent shrubs with rigid, spreading or divaricate branches and terete fleshy leaves---14. SARCOBATUS.

Plants annuals, perennials, or shrubs with more or less silvery-scurfy, flat leaves (see below)---6. ATRIPLEX.

Leaves alternate.

Flowers monoecious or dioecious (rarely perfect), the pistillate enclosed in two bracts.

Leaves terete, fleshy. Spinescent shrubs; staminate flowers in cylindric aments, without perianth; pistillate flowers solitary or few in the axils of the leaves, the perianth turbinate; fruit coriaceous, winged---14. SARCOBATUS.

Leaves not terete, the margin revolute in some species. Perianth none.

Plants densely hairy. Leaves linear to lanceolate, revolute; staminate flowers in clusters arranged in spikes, subtended by leaves; pistillate flowers in axillary clusters; plants 30 to 100 cm. high.
9. EUROTIA.

Plants not densely hairy.

Pubescence of simple or branched hairs. Diffusely branched shrubs with light gray or whitish bark; leaves 4 cm. long or less, linear-oblanceolate---8. GRAYIA.

Pubescence of inflated hairs or wanting.

Pistillate flowers without a perianth, the subtending bracts more or less united, entire or toothed, smooth or crested on the back---6. ATRIPLEX.

Pistillate flowers with a perianth of 3 or 4 hyaline sepals enclosed in a pair of partially united bracts. Lower leaves petioled, the blades triangular-hastate, 2 to 5 cm. long; plant 10 to 40 cm. high, branched from the base, glabrate in age---7. ENDOLEPIS.

Flowers perfect. Perianth present.

Flowers subtended by bractlets.

Bracts scalelike, shorter than the perianth; leaves terete or flat and linear, entire; flowers axillary, solitary or in glomerules; perianth 5-lobed, globose to urceolate, enclosing the fruit.
15. DONDIA.

Bracts equaling or exceeding the perianth; leaves linear, 1 to 3 cm. long, becoming spinescent; flowers axillary, solitary; perianth membranous, becoming winged and enclosing the fruit. Intricately branched annual, the stems striate--16. SALSOLA.

Flowers without subtending bractlets.

Fruit exserted, laterally flattened, margined or winged. Flowers solitary, axillary; caulescent annuals with narrow leaves.
11. CORISPERMUM.

Fruit enclosed in the perianth.

Fruiting calyx not winged.

Flowers with 1 sepal and 1 stamen, in axillary clusters. Fruit ovoid, the perianth adhering to the seed; branched annuals ---2. MONOLEPIS.

Flowers with 3 to 5 sepals and stamens.
Fruiting calyx fleshy, bright red in fruit_____5. **BLITUM.**
Fruiting calyx not fleshy, green or farinaceous.
4. CHENOPODIUM.

Fruiting calyx transversely winged.
Flowers solitary, glomerate or spicate. Perianth subglobose, 5-lobed, developing horizontal confluent wings; perennials.
10. KOCHIA.

Flowers spicate or paniculate.
Perianth keeled, developing a broad horizontal wing at maturity; annual, 30 to 60 cm. high; branches divaricate; leaves ovate to lanceolate, sinuate-dentate, 2 to 7 cm. long _____**3. CYCLOLOMA.**
Perianth lobes produced into spines in fruit; annual, 1 meter high or more; branches divaricate or ascending; leaves spatulate or linear-oblong, about 1 cm. long, loosely villous _____**17. BASSIA.**

1. NITROPHILA S. Wats.

1. Nitrophila occidentalis (Nutt.) S. Wats. in King, Geol. Expl. 40th Par. **5**: 297. 1871.

Halimocnemis occidentalis Nutt.; Moq. in DC. Prodr. **13**²: 279. 1849, as synonym.

Glaux acutifolia Heller, Muhlenbergia **2**: 109. 1906.

Desert areas and saline meadows of the artemisia belt. Oregon, California, and Nevada.

2. MONOLEPIS Schrad.

Leaves entire, oblong, obtuse, 4 to 12 mm. long; flowers in clusters of 3 to 5; pericarp tuberculate; plant 4 to 20 cm. high, farinose to glabrate, with dichotomous filiform branches_____**1. M. pusilla.**
Leaves hastately lobed, triangular to narrowly oblong, the blades 1 to 6.5 cm. long; flowers in many-flowered clusters; pericarp minutely pitted; plant 8 to 30 cm. high, much branched, succulent_____**2. M. nuttalliana.**

1. Monolepis pusilla Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 289. 1871.

Alkaline soil on plains and in foothills of the artemisia and pinyon belts. Wyoming and Colorado, westward to Washington and California.

2. Monolepis nuttalliana (Schult.) Greene, Fl. Franc. 168. 1891.

Blitum nuttallianum Schult. Mant. **1**: 65. 1822.

Plains, canyons, and dry slopes of the Covillea belt, upward to 2,700 meters. Minnesota to Texas, westward to Washington and California.

3. CYCLOLOMA Moq.

1. Cycloloma atriplicifolium (Spreng.) Coult. Mem. Torrey Club **5**: 143. 1894.

Salsola atriplicifolia Spreng. "Nachtr. Bot. Gart. Hal. **2**: 35. 1801"; Moq. Chenop. 18. 1840, as synonym.

Plains, fields, and sandbars along rivers of the artemisia belt. Ontario to Montana, Arkansas, and Arizona.

4. CHENOPODIUM L. Goosefoot

Leaves glandular. Annuals or perennials, 20 cm. high or more.
Inflorescence of densely many-flowered cymes, disposed in elongate panicles.
Leaf blades 1 to 5 cm. long, ovate to oblong, sinuate-pinnatifid, with rounded lobes——15. C. botrys.
Inflorescence of glomerules or spikes.
Plant a prostrate or decumbent annual, glandular-villous throughout; leaves oblong to ovate-oblong, toothed; inflorescence of short axillary clusters or spikes, shorter than the leaves——17. C. carinatum.
Plant an erect ill-scented annual, 1 meter high or less, glabrous or puberulent; leaves lanceolate to ovate, 2 to 12 cm. long, entire to sinuate-pinnatifid; inflorescence of dense or interrupted, slender or stout, elongate spikes——16. C. ambrosioides.
Leaves glabrate or more less farinose, never glandular.
Leaves linear to linear-oblong, entire or subhastate, short-petioled. Flower clusters spicate or cymose.
Leaves (except the lowest) 1-ribbed. Plants farinose, 10 to 80 cm. high.
Pericarp free from the seed——3. C. leptophyllum.
Pericarp adherent to the seed——6. C. inamoenum.
Leaves mostly 3-ribbed. Pericarp free from the seed.
Plant densely farinose, yellowish, branched throughout; leaves 1 to 2 cm. long, entire——5. C. desiccatum.
Plant glabrate, rarely densely farinose, green, simple at base, branched above; leaves 2 to 6 cm. long——4. C. pratericola.
Leaves broader, entire to coarsely toothed.
Leaf blades broadly ovate, 5 to 15 cm. long, with 5 or more broad triangular teeth and broad sinuses. Flowers in slender naked panicles; bright green annual, 0.3 to 1 meter high——2. C. hybridum.
Leaf blades entire to toothed or lobed, the teeth or lobes numerous, not divaricate.
Leaf blades (at least some) as long as wide, or the length slightly exceeding the width.
Plant low and spreading, densely farinose. Leaves rhombic or broadly ovate, obtuse, hastately 3-lobed, entire, glabrate above; flowers in glomerules, disposed in crowded paniculate spikes.
9. C. incanum.
Plants mostly erect, 20 to 80 cm. high.
Plant sparingly farinose or glabrate; leaf blades broadly triangular-hastate, 1.5 to 6 cm. long, thin, bright green; flowers in small glomerules, disposed in dense paniculate spikes.
10. C. fremonti.
Plant more or less densely farinose; leaf blades round-deltoid to rhombic, 1.5 to 4 cm. long, entire or round-lobed at base; flowers in large glomerules, disposed in dense paniculate spikes.
11. C. watsoni.
Leaf blades half to four times longer than wide.
Inflorescence mostly glomerate, or the upper glomerules in short spikes or cymes, shorter than the subtending leaves.
Leaf blades entire or obscurely sinuate-dentate, occasionally hastate, cuneate, orbicular to obovate, 7 to 25 mm. long. Flowers in sessile glomerules; plant 5 to 20 cm. high, branching from the base——20. C. humile.

Leaf blades distinctly toothed or pinnatifid. Plants 20 to 80 cm. high.

Leaf blades 1.5 to 3 cm. long, triangular-ovate to oblong, coarsely dentate, more or less farinose beneath. Plant glabrous with the exception of leaves and inflorescence____18. C. salinum.

Leaf blades 3 to 15 cm. long, mostly green on both sides, rhombic-ovate to ovate or deltoid-ovate.

Leaves laciniate-serrate to irregularly sinuate-dentate; calyx lobes carinate_____1. C. murale.

Leaves sinuate-dentate with obtuse lobes to nearly entire; calyx lobes rounded on the back_____19. C. rubrum.

Inflorescence glomerate below, paniculate and exceeding the subtending leaves above.

Leaf blades 1 to 3 cm. long, mostly entire, sometimes hastate.

Inflorescence nearly naked, loosely cymose-paniculate; leaf blades rhombic-ovate to ovate-oblong, cuneate; annual, 30 cm. high or less, subdichotomously branching from the base. 7. C. nevadense.

Inflorescence in more or less dense or interrupted, simple or paniculate spikes; leaf blades oblong to ovate, rounded to cuneate at base; annual, 50 cm. high or less, erect, simple or branching_____8. C. atrovirens.

Leaf blades 2 to 8 cm. long, mostly exceeding 3 cm. in length. Flowers in glomerules, disposed in spikes or cymes; plants 0.4 to 2 meters high.

Upper leaves conspicuously hastate, rhombic to ovate, entire or toothed, glabrous or nearly so_____12. C. petiolare.

Upper leaves entire or toothed, commonly not hastate.

Leaves green or nearly so, rhombic-ovate to oblong, sinuate-serrate to subentire_____13. C. paganum.

Leaves farinose, rhombic-oval to lanceolate, sinuate-dentate to subentire_____14. C. album.

1. Chenopodium murale L. Sp. Pl. 219. 1753.

Waste places; southeastern California. Introduced throughout North America; native of the Old World.

2. Chenopodium hybridum L. Sp. Pl. 219. 1753.

Waste places, canyons, and mountain meadows, upward to 2,700 meters; introduced from Europe. Quebec to British Columbia, southward to Texas and California; Europe, Asia, northern Africa, and Hawaii.

3. Chenopodium leptophyllum Nutt.; S. Wats. Proc. Amer. Acad. 9: 94. 1874.

Plains, canyons, and slopes of the artemisia, pinyon, yellow pine, and aspen belts. Manitoba to British Columbia and Mexico.

4. Chenopodium pratericola Rydb. Bull. Torrey Club 39: 310. 1912.

Plains and hillsides of the artemisia belt. Missouri to Mexico and Washington.

5. Chenopodium desiccatum A. Nels. Bot. Gaz. 34: 362. 1902.

Valleys and canyons, upward to 2,500 meters. South Dakota to New Mexico, westward to Idaho and southeastern California.

6. Chenopodium inamoenum Standl. N. Amer. Fl. 21: 15. 1916.

Canyons and mountain sides of the artemisia, pinyon, and aspen belts. Wyoming to Chihuahua, westward to eastern Oregon and Nevada.

7. Chenopodium nevadense Standl. N. Amer. Fl. **21**: 16. 1916.
Plains and hillsides of the artemisia and pinyon belts. Western Nevada.

8. Chenopodium atrovirens Rydb. Mem. N. Y. Bot. Gard. **1**: 131. 1900.
Plains and hillsides of the artemisia and pinyon belts. Montana to Colorado, westward to eastern Oregon and California.

9. Chenopodium incanum (S. Wats.) Heller, Pl. World **1**: 23. 1897.
Chenopodium fremonti incanum S. Wats. Proc. Amer. Acad. **9**: 94. 1874.
Plains and hillsides of the artemisia belt. Nebraska to Utah and Mexico.

10. Chenopodium fremonti S. Wats. in King, Geol. Expl. 40th Par. **5**: 287. 1871.
Plains, foothills, and canyons of the artemisia, pinyon, yellow pine, and aspen belts. Saskatchewan to British Columbia, southward to western Texas, Nevada, and northern Mexico.

11. Chenopodium watsoni A. Nels. Bot. Gaz. **34**: 362. 1902.
Foothills and mountain sides, upward to 2,700 meters. Montana to New Mexico and Arizona.

12. Chenopodium petiolare H. B. K. Nov. Gen. & Sp. **2**: 191. 1817.
Valleys and canyons of the Covillea, artemisia, and pinyon belts. Kansas to California and Mexico.

13. Chenopodium paganum Reichenb. Fl. Germ. 579. 1832.
Waste places and open ground; introduced from the Old World. Massachusetts to Virginia, New Mexico, Colorado, and Utah(?).

14. Chenopodium album L. Sp. Pl. 219. 1753. LAMBS-QUARTERS.
Waste places and along roads; introduced. Newfoundland to Alaska, southward to Florida and California; also in Europe, Asia, and northern Africa.

15. Chenopodium botrys L. Sp. Pl. 219. 1753. JERUSALEM-OAK.
Along ditches and in fields and canyons; introduced. Nova Scotia to Georgia, westward to British Columbia and California; also in Europe, Asia, and Africa.

16. Chenopodium ambrosioides L. Sp. Pl. 219. 1753.
Waste ground; California. Apparently not established in the Great Basin. Maine to Ontario and California, southward to South America.

17. Chenopodium carinatum R. Br. Prodr. Fl. Nov. Holl. 407. 1810.
Introduced from Australia and adjacent dominions and naturalized in Missouri, Texas, northern California, and the Sierra Nevada region.

18. Chenopodium salinum Standl. N. Amer. Fl. **21**: 29. 1916.
Flood plains and along rivers; San Juan River. Alberta to Nebraska, New Mexico, and Oregon (?).

19. Chenopodium rubrum L. Sp. Pl. 218. 1753.
Bottom lands, margins of ponds, and open woods, upward to 2,000 meters. Newfoundland to New Jersey, westward to British Columbia and northern New Mexico; also in Europe and Asia.

20. Chenopodium humile Hook. Fl. Bor. Amer. **2**: 127. 1838.
Borders of ponds and lakes of the artemisia belt, and upward to 3,000 meters. Saskatchewan to Nebraska, westward to British Columbia and California.

5. BLITUM L. BLITE

Inflorescence naked above; sepals acute; leaves broadly triangular-hastate to lanceolate, toothed or entire ..... 1. B. capitatum.
Inflorescence leafy throughout; sepals rounded; leaves triangular to rhombic-oblong, coarsely laciniate-dentate to entire ..... 2. B. virgatum.

1. Blitum capitatum L. Sp. Pl. 4. 1753.

Waste places, canyons, and meadows, upward to the spruce belt. Nova Scotia to New Jersey, westward to Alaska and California; also in Europe.

2. Blitum virgatum L. Sp. Pl. 4. 1753.

Waste places and along railroads; Idaho. Naturalized in a few parts of the United States; native of Europe, Asia, and northern Africa.

6. ATRIPLEX L. SALTBUSH

Leaves more or less distinctly sharp-toothed.
Leaves orbicular to round-ovate, 1.5 to 3.5 cm. long, white, the teeth triangular; fruiting bracts orbicular, free, entire; shrub, 0.3 to 1 meter high. 16. A. hymenelytra.
Leaves rhombic-ovate to oblong, cuneate to rounded at base, green or grayish; fruiting bracts rhombic to cuneate-orbicular, dentate; annual, 1 meter high or less, much branched ..... 3. A. rosea.
Leaves prevailingly entire, denticulate, or undulate, linear to hastate-ovate.
Leaves sessile or nearly so.
Upper leaves cordate and usually clasping, 5 to 10 mm. long. Fruiting bracts entire, 3 mm. long; shrub, 20 to 40 cm. high with whitish stems, spinescent branches, and grayish leaves ..... 20. A. parryi.
Upper leaves with a rounded or cuneate, not at all clasping base.
Leaves denticulate or entire, oblong to lance-oblong, 1.5 to 8 cm. long, obtuse or acute, sparingly farinose. Fruiting bracts cuneate-orbicular, dentate; annual, 1 meter high or less, glabrate. 17. A. serenana.
Leaves entire.
Plants annual, 5 to 30 cm. high.
Leaves linear or linear-oblong, 6 to 14 mm. long. Fruiting bracts 3-toothed; plant scurfy-canescent, diffusely branching. 13. A. wolfii.
Leaves ovate to oblong, 2 to 8 cm. long.
Fruiting bracts tuberculate below the middle, united, entire or with few teeth ..... 14. A. tenuissima.
Fruiting bracts thin, smooth, entire ..... 15. A. pusilla.
Plants perennials or shrubs.
Leaves linear to narrowly oblong.
Leaves 6 to 15 mm. long, obtuse. Fruiting bracts obovate, united to above the middle; shrub, 10 to 20 cm. high, forming dense mats ..... 22. A. corrugata.
Leaves 15 to 50 mm. long.
Plant a shrub, 60 to 150 cm. high, with whitish branches. Fruiting bracts united nearly to apex, each with broad dorsal wings ..... 31. A. canescens.
Plants suffrutescent perennials, 20 to 50 cm. high.
Fruiting bracts as broad as long, irregularly dentate, united below ..... 23. A. tridentata.

Fruiting bracts lanceolate to ovate, entire or denticulate, united nearly to apex_____25. A. falcata.

Leaves broader.

Plant a shrub 60 to 200 cm. high, with slender divaricate branches; leaves crowded, spatulate, oblong or obovate, 2 to 6 mm. long or more; fruiting bracts laciniate-dentate, the teeth linear, appendaged on the back_____21. A. polycarpa.

Plant a perennial or shrub, 20 to 30 cm. high, with spinose branches; leaves oval-oblong to obovate, 8 to 25 mm. long; fruiting bracts dentate, smooth on the back___29. A. collina.

Leaves, except the uppermost, more or less distinctly petioled.

Plants bright green annuals with striped stems and branches.

Fruiting bracts thin, round-oval, united at base, entire or denticulate, unappendaged; plant 0.5 to 2.5 meters high; leaves lance-oblong to broadly triangular_____1. A. hortensis.

Fruiting bracts triangular-ovate, with 1 or 2 marginal teeth and as many tubercles on the back; plant 0.5 to 1 meter high; leaves round-deltoid to triangular-hastate_____2. A. hastata.

Plants not bright green, more or less mealy or silvery.

Plants shrubs or woody perennials, 0.2 to 2 meters high or more.

Branches conspicuously angled, light brown, spinescent. Leaves triangular-oblong to subhastate-ovate, 2 to 3.5 cm. long; fruiting bracts orbicular or nearly so, free, smooth on the back.

18. A. torreyi.

Branches terete or nearly so.

Leaves deltoid-hastate to deltoid-ovate, broadest below the middle.

Leaf lobes and apex acute or acuminate; fruiting bracts united nearly to apex, entire or laciniate, beset with linear appendages on the back_____27. A. phyllostegia.

Leaf lobes and apex rounded or blunt; fruiting bracts united to above the middle, orbicular, crenulate, smooth on the back.

19. A. lentiformis.

Leaves mostly with a distinctly cuneate base.

Stems prostrate, slender_____32. A. semibaccata.

Stems erect, mostly stout.

Fruiting bracts 4-winged, the wings irregularly dentate. Leaves oval to obovate, entire, 4 cm. long or less; shrub, about 30 cm. high; branches and leaves yellowish.

30. A. garrettii.

Fruiting bracts crested or tubercled but not winged.

Fruiting bracts entire, 6 to 12 mm. long, oval to suborbicular, united at the base. Leaves oval to suborbicular, 1 to 2 cm. long; shrub, 0.3 to 1 meter high; branches spinose.

28. A. confertifolia.

Fruiting bracts more or less toothed, appendaged on the back.

Leaves 1 to 4 cm. long.

Petioles half as long as the oval to broadly oblong blade; fruiting bracts united nearly to the triangular apex, dentate_____24. A. cuneata.

Petioles very short; leaves oblong to obovate; fruiting bracts united to above the middle, laciniate or dentate, the terminal tooth not conspicuous____26. A. nuttallii.

Plants annual.
Staminate flowers in loose naked terminal panicles. Pistillate flowers axillary, solitary or in fascicles; fruiting bracts united, entire or undulate; plant 15 to 30 cm. high; leaves round-deltoid to ovate-orbicular, 1 to 2 cm. long_____4. A. graciliflora.
Staminate flowers in axillary glomerules or terminal spikes.
Staminate flowers axillary and spicate.
Leaf blades cordate-ovate to subhastate, 8 to 25 mm. long. Fruiting bracts dissimilar, the larger suborbicular, dentate, and crested, the smaller oblong, truncate or emarginate, smooth _____5. A. saccaria.
Leaf blades never cordate.
Fruiting bracts united nearly to apex, dentate, smooth or tuberculate; leaves triangular-ovate to round-ovate or subhastate, 2 to 6 cm. long. Plant with angled branches. 6. A. argentea.
Fruiting bracts united to the middle, laciniate, smooth or muricate on the back; leaves ovate to oblong, 1.5 to 3.5 cm. long_____7. A. rydbergii.
Staminate flowers in axillary glomerules.
Leaf blades conspicuously 3-nerved, rhombic-ovate to suborbicular, 1 to 4 cm. long. Fruiting bracts united below, coarsely dentate, truncate, more or less crested on the back. 10. A. powellii.
Leaf blades not conspicuously if at all 3-nerved.
Fruiting bracts obovate or broadly cuneate, truncate and toothed at apex.
Plant 1 meter high or less; leaves round-deltoid to rhombic or subhastate, 1.5 to 4 cm. long; fruiting bracts 3-toothed. 11. A. truncata.
Plant 5 to 20 cm. high, with procumbent stems; leaves ovate to ovate-oblong, 7 to 15 mm. long; fruiting bracts several-toothed _____12. A. subdecumbens.
Fruiting bracts ovate, not truncate, appendaged on the back.
Plants 10 to 50 cm. high.
Fruiting bracts pediceled, laciniate; leaves deltoid-ovate to oblong or suborbicular, 1 to 3 cm. long. 8. A. caput-medusae.
Fruiting bracts sessile, dentate; leaves broadly oblong to rhombic-orbicular, 0.8 to 3 cm. long____9. A. hillmani.

1. Atriplex hortensis L. Sp. Pl. 1053. 1753. GARDEN ORACH.

Along irrigating ditches; introduced from Europe. New York to Montana and Utah.

2. Atriplex hastata L. Sp. Pl. 1053. 1753.

Atriplex carnosa A. Nels. Bot. Gaz. **34**: 361. 1902.

Atriplex subspicata Rydb. Bull. Torrey Club **33**: 137. 1906.

Alkaline meadows and valleys of the artemisia and pinyon belts. Nova Scotia to North Carolina, westward to Oregon and California; also in Europe, Asia, and northern Africa.

3. Atriplex rosea L. Sp. Pl. ed. 2. 1493. 1763.

Atriplex spatiosa A. Nels. Bot. Gaz. **34**: 360. 1902.

Fields and waste places; introduced from southern Europe. Wyoming to Washington and Mexico; also in the Atlantic States.

4. Atriplex graciliflora Jones, Proc. Calif. Acad. II. 5: 717. 1895.
Alkaline soil of the artemisia belt; near Henry Mountains, Utah.

5. Atriplex saccaria S. Wats. Proc. Amer. Acad. 9: 112. 1874.
Atriplex cornuta Jones, Proc. Calif. Acad. II. 5: 718. 1895.
Plains, hillsides, and rocky canyons of the artemisia and pinyon belts. Southwestern Wyoming to northwestern New Mexico and Arizona.

6. Atriplex argentea Nutt. Gen. Pl. 1: 198. 1818.
Alkaline plains and in valleys. Western North Dakota to New Mexico and California.

7. Atriplex rydbergii Standl. N. Amer. Fl. 21: 47. 1916.
Plains of the artemisia belt; eastern Utah.

8. Atriplex caput-medusae Eastw. Proc. Calif. Acad II. 6: 316. *pl. 46.* 1893.
Plains and hillsides of the artemisia and pinyon belts. Southwestern Colorado, southeastern Utah, New Mexico, and Arizona.

9. Atriplex hillmani (Jones) Standl. N. Amer. Fl. 21: 48. 1916.
Atriplex argentea hillmani Jones, Contr. West. Bot. 11: 21. 1903.
Plains and hillsides of the artemisia belt. Southeastern Oregon and Nevada.

10. Atriplex powellii S. Wats. Proc. Amer. Acad. 9: 114. 1874.
Alkaline plains and along alkaline lakes. South Dakota and Montana to northwestern New Mexico and Arizona.

11. Atriplex truncata (Torr.) A. Gray, Proc. Amer. Acad. 8: 398. 1872.
Obione truncata Torr.; S. Wats. in King, Geol. Expl. 40th Par. 5: 291. 1871.
Desert areas and alkaline places of the artemisia belt. Montana to British Columbia, southward to New Mexico and California.

12. Atriplex subdecumbens Jones, Proc. Calif. Acad. II. 5: 716. 1895.
Mountain meadows of the spruce belt; Fish Lake, Utah.

13. Atriplex wolfii S. Wats. Proc. Amer. Acad. 9: 112. 1874.
Alkaline soil and rocky hillsides of the artemisia and pinyon belts. Southern Wyoming, Colorado, and Utah.

14. Atriplex tenuissima A. Nels. Bot. Gaz. 34: 359. 1902.
On plains of the artemisia belt; Gunnison, Utah.

15. Atriplex pusilla (Torr.) S. Wats. Proc. Amer. Acad. 9: 110. 1874.
Obione pusilla Torr.; S. Wats. in King, Geol. Expl. 40th Par. 5: 291. 1871.
Valleys and desert areas. Southeastern Oregon and northern Nevada.

16. Atriplex hymenelytra (Torr.) S. Wats. Proc. Amer. Acad. 9: 119. 1874.
DESERTHOLLY.
Obione humenelytra Torr. U. S. Rep. Expl. Miss. Pacif. 4: 129. 1857.
Desert washes and hillsides of the Covillea and artemisia belts. Western Arizona, southern Nevada, and California.

17. Atriplex serenana A. Nels. Proc. Biol. Soc. Washington 17: 99. 1904.
Alkaline plains and dry hillsides. Western Nevada and southern California.

18. Atriplex torreyi S. Wats. Proc. Amer. Acad. 9: 119. 1874.
Alkaline plains and in valleys of the Covillea and artemisia belts. Southwestern Utah, southern Nevada, and California.

19. Atriplex lentiformis (Torr.) S. Wats. Proc. Amer. Acad. 9: 118. 1874.
Obione lentiformis Torr. in Sitgreaves, Rep. Zuñi & Colo. 169. 1853.
Valleys and desert areas of the Covillea belt. Southwestern Utah to southern California and Mexico.

20. Atriplex parryi S. Wats. Proc. Amer. Acad. **17**: 378. 1882.

Desert areas and margins of alkali flats of the Covillea belt. Southern Nevada and southern California.

21. Atriplex polycarpa (Torr.) S. Wats. Proc. Amer. Acad. **9**: 117. 1874.

Obione polycarpa Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 130. 1857.

Desert areas and gravelly hillsides of the Covillea belt. Southern Nevada and Arizona to southern California and Mexico.

22. Atriplex corrugata S. Wats. Bot. Gaz. **16**: 345. 1891. MAT SALTBUSH.

Plains and hillsides of the artemisia belt. Colorado and eastern Utah.

23. Atriplex tridentata Kuntze, Rev. Gen. Pl. **2**: 546. 1891.

Alkaline plains. Wyoming, Colorado, and Utah.

24. Atriplex cuneata A. Nels. Bot. Gaz. **34**: 357. 1902.

Plains and hillsides of the artemisia belt. Utah, Colorado, northern Arizona, and New Mexico.

25. Atriplex falcata (Jones) Standl. N. Amer. Fl. **21**: 68. 1916.

Atriplex nuttallii falcata Jones, Contr. West. Bot. **11**: 19. 1903.

Plains and dry hillsides of the artemisia belt. Southeastern Washington to northern Utah and Nevada.

26. Atriplex nuttallii S. Wats. Proc. Amer. Acad. **9**: 116. 1874.

MOUND SALTBUSH.

Atriplex nuttallii utahensis Jones, Contr. West. Bot. **11**: 19. 1903.

Plains and dry hillsides of the artemisia and pinyon belts. Saskatchewan to Nebraska and Nevada.

27. Atriplex phyllostegia (Torr.) S. Wats. Proc. Amer. Acad. **9**: 108. 1874.

Obione phyllostegia Torr.; S. Wats. In King, Geol. Expl. 40th Par. **5**: 291. 1871.

Atriplex draconis Jones, Contr. West. Bot. **8**: 40. 1898.

Plains and hillsides of the artemisia and pinyon belts. Western Utah and Nevada.

28. Atriplex confertifolia (Torr. & Frém.) S. Wats. Proc. Amer. Acad. **9**: 119. 1874. SHADSCALE.

Obione confertifolia Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 318. 1845.

Plains and hillsides of the Covillea, artemisia, and pinyon belts, forming large and dense colonies. North Dakota to Oregon and California, southward to Mexico.

29. Atriplex collina Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 119. 1913.

Plains and hillsides; Montrose, Colorado. Northwestern New Mexico, Arizona, southern Colorado, and southern Utah (?).

30. Atriplex garrettii Rydb. Bull. Torrey Club **39**: 312. 1912.

Plains of the artemisia belt; near Moab, Utah.

31. Atriplex canescens (Pursh) Nutt. Gen. Pl. **1**: 197. 1818.

FOURWING SALTBUSH.

Calligonum canescens Pursh, Fl. Amer. Sept. 370. 1814.

Atriplex tetraptera Rydb. Bull. Torrey Club **39**: 311. 1912.

Plains and foothills of the Covillea, artemisia, and pinyon belts. South Dakota to Oregon, California, and Mexico.

32. Atriplex semibaccata R. Br. Prodr. Fl. Nov. Holl. 406. 1910.

In fields, St. George, Utah. Introduced from Australia.

7. ENDOLEPIS Torr.

1. **Endolepis covillei** Standl. N. Amer. Fl. 21: 73. 1916.

Desert areas, alkaline meadows, and about salt springs. Western Nevada and southern California.

8. GRAYIA Hook. & Arn. HOP-SAGE

Branches spinose; staminate flowers glomerate, in short dense terminal spikes; pistillate flowers in terminal spikes; fruiting bracts obovate-orbicular, glabrous ..... 1. G. spinosa.

Branches not spinose; staminate flowers glomerate in slender, terminal or axillary spikes; pistillate flowers in slender paniculate spikes; fruiting bracts obovate-orbicular, emarginate, puberulent ..... 2. G. brandegei.

1. **Grayia spinosa** (Hook.) Moq. in DC. Prodr. 13²: 119. 1849.

Chenopodium spinosum Hook. Fl. Bor. Amer. 2: 127. 1838.

Plains and dry slopes of the upper Covillea and lower artemisia belts, forming a smaller intergrading belt. It is associated with *Clistoyucca brevifolia*. Wyoming and Utah, westward to Washington and California.

2. **Grayia brandegei** A. Gray, Proc. Amer. Acad. 11: 101. 1876.

Plains and dry hillsides of the artemisia belt. Colorado and Utah.

9. EUROTIA Adans. WINTER-FAT

Stems and leaves shortly stellate-pubescent and villous; stems woody at or near base ..... 1. E. lanata.

Stems and leaves stellate-pubescent only; stems woody nearly throughout, becoming spinescent ..... 2. E. subspinosa.

1. **Eurotia lanata** (Pursh) Moq. Chenop. 81. 1840.

Diotis lanata Pursh, Fl. Amer. Sept. 2: 602. 1814.

Plains and dry mountain sides of the Covillea, artemisia, and pinyon belts. Saskatchewan to Texas, westward to Washington and California.

2. **Eurotia subspinosa** Rydb. Bull. Torrey Club 39: 312. 1912.

Desert areas and dry mountain sides of the Covillea, artemisia, and pinyon belts. Southern Utah to southern California and Mexico.

10. KOCHIA Roth. MOLLY

Stems branching above, tomentose; leaves flat, linear-oblong, remote, 5 to 17 mm. long, sericeous ..... 1. K. californica.

Stems usually branched at base only; leaves terete, linear, 7 to 25 mm. long.

Stems and leaves permanently sericeous or hairy; flowers tomentulose. 2. K. vestita.

Stems and leaves glabrate in age; flowers white-tomentose 3. K. americana.

1. **Kochia californica** S. Wats. Proc. Amer. Acad. 17: 378. 1882.

CALIFORNIA MOLLY.

Desert areas of the Covillea belt. Southern Nevada and southern California.

2. **Kochia vestita** (S. Wats.) Rydb. Colo. Agr. Exp. Sta. Bull. 100: 119. 1906.

GRAY MOLLY.

Kochia americana vestita S. Wats. Proc. Amer. Acad. 9: 93. 1874.

Valleys, desert areas, and hillsides of the artemisia belt. Wyoming and Colorado, westward to Oregon and California.

3. **Kochia americana** S. Wats. Proc. Amer. Acad. 9: 93. 1874. GREEN MOLLY.

Plains and foothills of the artemisia belt. Wyoming to northern New Mexico and California.

11. CORISPERMUM L. Bugseed

Plant more or less densely villous or pubescent, 20 to 60 cm. high. Upper leaves or bracts ovate-oblong, cuspidate, scarious; spikes dense, 5 to 10 mm. in diameter; fruit with an obscurely winged margin__3. C. villosum.
Plants glabrous or sparingly pubescent, 20 to 50 cm. high, diffusely branched.
Fruit distinctly winged, 2 to 3 mm. long; spikes lax, the lower bracts subulate and with broad scarious-margined base_____1. C. nitidum.
Fruit acute-margined, scarcely winged, 2 to 3 mm. long; spikes dense, the bracts mostly ovate-acuminate, scarious-margined__2. C. emarginatum.

1. Corispermum nitidum Kit.; Schult. Oesterr. Fl. ed. 2. 1: 7. 1814.

Fields, along roads, and in canyons, upward to 2,400 meters. North Dakota to Illinois, Texas, Arizona, and Idaho; also in Europe.

2. Corispermum emarginatum Rydb. Bull. Torrey Club 31: 404. 1904.

Desert areas and valleys of the artemisia belt. Alberta to Colorado and Nevada.

3. Corispermum villosum Rydb. Bull. Torrey Club 24: 191. 1897.

Desert areas and along railroads; Idaho. Saskatchewan to northern New Mexico and Arizona.

12. ALLENROLFEA Kuntze. Pickleweed

1. Allenrolfea occidentalis (S. Wats.) Kuntze, Rev. Gen. Pl. 2: 546. 1891.

Halostachys occidentalis S. Wats. in King, Geol. Expl. 40th Par. 5: 293. 1871.

Saline areas and washes of the Covillea and artemisia belts. Western Texas to Utah, Nevada, and California. Sometimes called burro-weed.

13. SALICORNIA L. Samphire

Plant annual, 10 to 25 cm. high; joints 5 to 12 mm. long, 1 to 2 mm. thick; flower spikes 5 cm. long, 2.5 mm. thick or less_____1. S. rubra.
Plant perennial, 15 to 30 cm. high; joints 7 to 18 mm. long, 2 to 5 mm. thick; flower spikes 2 cm. long or less, 4 mm. thick____2. S. utahensis.

1. Salicornia rubra A. Nels. Bull. Torrey Club 26: 122. 1899.

Western samphire.

Deserts and salt meadows of the artemisia belt. Saskatchewan to Kansas, westward to British Columbia and Nevada.

2. Salicornia utahensis Tidestrom, Proc. Biol. Soc. Washington 26: 13. 1913.

Utah samphire.

Borders of salt lakes and in alkaline places of the artemisia belt. Utah.

14. SARCOBATUS Nees. Greasewood

Leaves glabrous or nearly so, 1 to 3 cm. long; fruit glabrous, the body 4 to 5 mm. long, the wing 7 to 13 mm. broad; shrub 3 meters high or less, the branchlets yellowish white_____1. S. vermiculatus.
Leaves finely stellate-pubescent, 5 to 14 mm. long; fruit puberulent, the body 8 to 9 mm. long, the wing 10 to 15 mm. broad; shrub 0.5 to 1 meter high, the branchlets whitish_____2. S. baileyi.

1. Sarcobatus vermiculatus (Hook.) Torr. in Emory, Mil. Reconn. 149. 1848.

Batis vermiculata Hook. Fl. Bor. Amer. 2: 128. 1838.

Alkaline plains and slopes of the Covillea and artemisia belts, forming large colonies. Montana to New Mexico, westward to Washington and California.

2. Sarcobatus baileyi Coville, Proc. Biol. Soc. Washington 7: 77. 1892.

Hillsides and plateaus of the artemisia and pinyon belts. Eastern California and Nevada.

15. DONDIA Adans. SEEPWEED

Perianth lobes crested or winged.

Leaves of the inflorescence ovate to ovate-lanceolate, crowded above; annual or perennial, 20 to 40 cm. high, branched from the base, the branches erect or prostrate ..... 1. D. depressa.

Leaves of the inflorescence linear or linear-lanceolate; annual, 6 to 60 cm. high, erect, branched or nearly simple ..... 2. D. occidentalis.

Perianth lobes not crested (at most carinate).

Stem and leaves more or less densely pubescent. Leaves strongly flattened, 5 to 20 mm. long, obtuse or acute; perennial, woody at base, 1 meter high or less, much branched ..... 6. D. ramosissima.

Stem and leaves glabrous or nearly so.

Leaves conspicuously contracted toward the base, 7 to 25 mm. long, somewhat flattened, not crowded; annual or perennial, 1 meter high or less ..... 3. D. nigra.

Leaves not conspicuously contracted toward the base; perennials, 1 meter high or less.

Leaves strongly flattened, 2 to 3 cm. long, acute or acuminate, the upper reduced; seed black, tuberculate ..... 4. D. torreyana.

Leaves terete or nearly so, 10 to 15 mm. long or more, acute or obtuse, those of the inflorescence scarcely reduced; seed black, shining ..... 5. D. intermedia.

1. Dondia depressa (Pursh) Britton; Britt. & Brown, Illustr. Fl. 1: 585. 1896.

Salsola depressa Pursh, Fl. Amer. Sept. 197. 1814.

Alkaline soil on plains and in valleys of the Covillea and artemisia belts, Saskatchewan to western Texas and California.

2. Dondia occidentalis (S. Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.

Schoberia occidentalis S. Wats. in King, Geol. Expl. 40th Par. 5: 295. 1871.

Alkaline soil on plains and in valleys of the artemisia belt. Eastern Washington to southwestern Wyoming, Colorado, and northern Nevada.

3. Dondia nigra (Raf.) Standl. N. Amer. Fl. 21: 89. 1916.

Chenopodium nigrum Raf. Atl. Journ. 146. 1832.

Alkaline soil of plains and valleys, about pools of the Covillea and artemisia belts. Minnesota to western Texas, westward to California and Mexico.

4. Dondia torreyana (S. Wats.) Standl. N. Amer. Fl. 21: 90. 1916.

Suaeda torreyana S. Wats. Proc. Amer. Acad. 9: 88. 1874.

Alkaline soil and low meadows of the Covillea and artemisia belts. Eastern Oregon to western New Mexico and California.

5. Dondia intermedia (S. Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.

Suaeda intermedia S. Wats. Proc. Amer. Acad. 14: 296. 1879.

Alkaline plains. Idaho to California and Mexico.

6. Dondia ramosissima Standl. N. Amer. Fl. 21: 91. 1916.

Desert areas and in valleys of the Covillea belt. Western Arizona to southeastern California and Mexico.

16. SALSOLA L. Russianthistle

1. **Salsola pestifer** A. Nels.; Coulter, New Man. Rocky Mount. 169. 1909.

Desert areas, plains, and foothills of the Covillea, artemisia, and pinyon belts; introduced and established throughout western United States. Native of Russia and western Asia.

17. BASSIA All.

1. **Bassia hyssopifolia** (Pall.) Kuntze, Rev. Gen. Pl. 1: 547. 1891.

Suaeda hyssopifolia Pall. Illustr. Pl. 44. *pl. 36.* 1803.

Waste places; near U. S. Experiment Station, Fallon, Nevada. Introduced from western Asia.

37. AMARANTHACEAE. Amaranth Family

Annual or perennial herbs with simple, opposite or alternate, estipulate leaves; flowers monoecious or dioecious, in axillary or terminal clusters or spikes; perianth 2 to 5-parted or of distinct sepals; stamens 1 to 5, opposite the sepals; ovary 1-celled, 1-ovuled; fruit a circumscissile utricle; seeds smooth.

Leaves alternate, petiolate; flowers monoecious, dioecious, or polygamous, disposed in axillary glomerules, spikes, or panicles; stamens 5 (rarely 1 to 3); filaments distinct; anthers 4-celled; ovary ovoid; style short or wanting; style branches 2 or 3; utricle compressed, included in the perianth ..... 1. AMARANTHUS.

Leaves mostly opposite, petiolate, broad; flowers glomerate in the axils of the leaves, bracted; stamens 5; filaments connate; staminodes present or absent; anthers 2-celled; ovary globose; style short; utricle compressed, glabrous ..... 2. TIDESTROMIA.

1. AMARANTHUS L. Amaranth

Leaves linear to linear-lanceolate, 4 to 7 cm. long. Inflorescence spikelike, 9 to 30 cm. long; flowers in glomerules; sepals of pistillate flowers spatulate, veined, fimbriate; plants 1 meter high or less, glabrous or puberulent ..... 3. A. fimbriatus.

Leaves (except the uppermost) broader.

Flowers in small axillary glomerules shorter than the leaves.

Plants viscid-puberulent, 10 to 30 cm. high, diffusely branched. Leaves petioled, the blades elliptic to obovate, 7 to 15 mm. long, the margin crisped, the midvein excurrent, spinulose ..... 12. A. pubescens.

Plants glabrous or sparingly pubescent. Midrib of leaves excurrent into a prickle.

Leaf blades 5 to 20 mm. long, commonly less than 10 mm., subrotund to spatulate. Sepals of pistillate flowers minute; plants prostrate, the stems 10 to 50 cm. long ..... 11. A. californicus.

Leaf blades 8 to 70 mm. long, commonly much longer than 10 mm., cuneate, rounded or acute at apex.

Plants prostrate; stems 15 to 60 cm. long; leaf blades obovate to spatulate; seeds about 1.6 mm. in diameter ..... 10. A. blitoides.

Plants erect; stems 1 meter high or less; leaf blades oblong to obovate; seeds about 0.8 mm. in diameter ..... 13. A. graecizans.

Flowers in terminal or axillary spikes or spikelike panicles and axillary clusters.

Plants more or less pubescent or villous throughout. Plants 0.3 to 3 meters high.

Sepals obtuse. Spikes erect, 8 to 20 mm. thick, in dense clusters; leaf blades rhombic-ovate to lanceolate, 3 to 12 cm. long.
9. A. retroflexus.

Sepals acute.
Inflorescence red; spikes usually 6 to 8 mm. thick, 4 to 10 cm. long; leaf blades rhombic-ovate to elliptic, 4 to 30 cm. long. Stem and leaves purplish——**5. A. cruentus.**
Inflorescence green; spikes 6 to 12 mm. thick, 2 to 12 cm. long; leaf blades ovate to rhombic-ovate, 3 to 15 cm. long——**6. A. hybridus.**
Plants glabrous, at least below, 0.5 to 2 meters high; inflorescence glabrous or pubescent.
Sepals clawed or contracted near base.
Subtending bracts lanceolate, equaling the flowers. Leaf blades oval-oblong to linear——**2. A. torreyi.**
Subtending bracts oblong to linear or subulate, usually exceeding the flowers.
Bracts oblong or oblong-linear; leaf blades elliptic to linear.
4. A. pringlei.
Bracts subulate; leaf blades rhombic-ovate to linear——**1. A. palmeri.**
Sepals not clawed. Leaf blades rhombic-ovate to lanceolate.
Spikes naked, dense; sepals acute, scarious——**7. A. powellii.**
Spikes leafy; sepals obtuse, purplish——**8. A. wrightii.**

1. Amaranthus palmeri S. Wats. Proc. Amer. Acad. **12**: 274. 1877.

Plains, fields, and waste ground of the Covillea belt; southern Nevada. Western Texas to southern California and southward.

2. Amaranthus torreyi (A. Gray) Benth.; S. Wats. Bot. Calif. **2**: 42. 1880.
Amblogyne torreyi A. Gray, Proc. Amer. Acad. **5**: 167. 1861.

Plains and hillsides of the artemisia belt. Iowa to Texas, westward to Nevada.

3. Amaranthus fimbriatus (Torr.) Benth.; S. Wats. Bot. Calif. **2**: 42. 1880.
Sarratia berlandieri fimbriata Torr. U. S. & Mex. Bound. Bot. 179. 1859.

Plains and dry rocky canyons of the Covillea belt. Southern Utah to California and southward.

4. Amaranthus pringlei S. Wats. Proc. Amer. Acad. **22**: 476. 1887.

Foothills and lower canyons of the Covillea belt; southern Nevada. Western Texas to Nevada and southward.

5. Amaranthus cruentus L. Syst. Veg. ed. 10. 1269. 1759.

Introduced and escaped from cultivation about settlements; Nevada and northern Arizona. Temperate and tropical America.

6. Amaranthus hybridus L. Sp. Pl. 990. 1753.

Waste and cultivated ground about settlements; introduced. Rhode Island to Alberta and California, southward to West Indies and Mexico; also in Europe.

7. Amaranthus powellii S. Wats. Proc. Amer. Acad. **10**: 347. 1875.

Cultivated fields, waste ground, and canyons of the Covillea belt, upward to the aspen belt. Wyoming to Oregon, southward to Mexico.

8. Amaranthus wrightii S. Wats. Proc. Amer. Acad. **12**: 275. 1877.

Artemisia belt. Southern Colorado to western New Mexico and Arizona. Possibly extending into southern Utah.

9. Amaranthus retroflexus L. Sp. Pl. 991. 1753. PIGWEED.

Waste ground, fields, and canyons of the Covillea and artemisia belts; introduced from Europe. Vermont to British Columbia, southward to Florida and Mexico.

10. Amaranthus blitoides S. Wats. Proc. Amer. Acad. 12: 273. 1877.

Dry ground, valleys, and cultivated fields and canyons, upward to 2,700 meters. Washington to Kansas, Texas, and Mexico.

11. Amaranthus californicus (Moq.) S. Wats. Bot. Calif. 2: 42. 1880.

Mengea californica Moq. in DC. Prodr. 13²: 270. 1849.

Alkaline flats, roadsides, along ditches, and river banks of the Covillea and artemisia belts. Alberta to Washington, California, and Nevada.

12. Amaranthus pubescens (Uline & Bray) Rydb. Bull. Torrey Club 39: 313. 1912

Amaranthus graecizans pubescens Uline & Bray, Bot. Gaz. 19: 317. 1894.

Plains and dry mountain sides of the artemisia, pinyon, and yellow pine belts. New Mexico to Nevada and southern California.

13. Amaranthus graecizans L. Sp. Pl. 990. 1753.

Valleys, cultivated fields, and roadsides. Rhode Island to British Columbia, southward to West Indies and Mexico; also in the Old World.

2. TIDESTROMIA Standl.

Leaves orbicular to ovate-orbicular, stellate-pubescent, the blades 5 to 30 mm. long; prostrate or procumbent annual, stellate-pubescent to glabrate; stems 10 to 50 cm. long ..... 1. T. lanuginosa.

Leaves oblong to ovate-orbicular, stellate-pubescent, the blades 8 to 40 mm. long; perennial with ascending or decumbent stems 20 to 60 cm. long. ..... 2. T. oblongifolia.

1. Tidestromia lanuginosa (Nutt.) Standl. Journ. Washington Acad. Sci. 6: 70. 1916.

Achyranthes lanuginosa Nutt. Trans. Amer. Phil. Soc. n. ser. 5: 166. 1837.

Plains and canyons, along San Juan River, Utah, at 1,200 to 1,500 meters. Western Kansas to southeastern Utah, southward to western Texas and Mexico.

2. Tidestromia oblongifolia (S. Wats.) Standl. Journ. Washington Acad. Sci. 6: 70. 1916.

Cladothrix oblongifolia S. Wats. Proc. Amer. Acad. 17: 376. 1882.

Desert areas, canyons, and gravelly hillsides of the Covillea belt. Arizona, Nevada, and California.

38. NYCTAGINACEAE. Four-o'clock Family

Annual or perennial herbs with dichotomous stems, the joints often swollen; leaves opposite or alternate, usually entire, stipulate, petiolate or sessile; flowers regular, perfect or sometimes unisexual, mostly subtended by bracts forming a calyx-like involucre; perianth corolla-like, campanulate or tubular with a rotate limb, white to purple; stamens 1 to many; ovary 1-celled, superior, sessile or short-stalked; stigma usually capitate; ovule solitary, erect; fruit an anthocarp, indehiscent, either fleshy, leathery, or hard, either angled, ribbed, grooved, or winged.

Flowers without an involucre, or each flower subtended by 1 to 3 bracts.

Fruit (and ovary) conspicuously winged. Cespitose perennial; leaves ovate to suborbicular, obtuse, 1 to 3 cm. long, hispidulous; perianth 3 cm. long, greenish ..... 1. SELINOCARPUS.

Fruit not winged.
Bracts very large and leaflike. Plants 30 to 60 cm. high, glabrous, with stout ascending stem; leaves broadly ovate to subcordate; heads 6-flowered; perianth light purple, slightly lobed.
2. HERMIDIUM.
Bracts very small, not leaflike.
Perianth 2 to 2.5 cm. long; leaves thick and fleshy, large, mostly basal, ovate to orbicular, crenate or toothed; plants 40 cm. high or more; fruit 10-ribbed 3. ANULOCAULIS.
Perianth 1.5 mm. long; leaves thin, small, cauline, linear to ovate, 1 to 3 cm. long; fruit 4 or 5-angled; plants 40 cm. high or less, viscid-pubescent 4. BOERHAAVIA.
Flowers subtended by a gamophyllous calyx-like involucre, or the flowers capitate and subtended by an involucre of numerous bracts.
Involucre of few or numerous distinct bracts; flowers numerous, capitate.
Fruit large, the broad thin wings extending all around the body; perianth 4-parted. Leaves elliptic to lanceolate, petioled; annuals; bracts lanceolate 5. TRIPTEROCALYX.
Fruit small, with thick narrow wings, or not winged; perianth 5-parted.
Bracts varying from linear to broad 6. ABRONIA.
Involucre of united bracts (only slightly united in *Wedeliella*); flowers few in each involucre.
Fruit lenticular, the margins dentate and recurved, with stipitate glands on the dorsal surface. Flowers 3 in each involucre, white or rose-colored, 5 to 6 mm. long; plants prostrate; leaves ovate or oblong, 1 to 3 cm. long 7. WEDELIELLA.
Fruit terete or angled, never lenticular, nor with dentate margins.
Fruit 5-sulcate, constricted at base. Involucre 1 to 5-flowered; perianth companulate or short-salverform 8. ALLIONIA.
Fruit terete, never sulcate or constricted at base.
Involucre 1-flowered. Perianth campanulate, white or purplish; leaf blades ovate, 3 cm. long or more 9. HESPERONIA.
Involucre 3 to 10-flowered.
Perianth 7 to 10 mm. long, the tube very short; involucre rotate after anthesis; leaf blades cordate-ovate, acute or acuminate, 2 to 5 cm. long; plants glandular-viscid, diffusely branched.
10. ALLIONIELLA.
Perianth 3.5 to 5.5 cm. long, the tube elongate; involucre tubular-campanulate; leaf blades broadly ovate or subcordate, acute, 3 to 7 cm. long; perennials with spreading or ascending stems.
11. QUAMOCLIDION.

1. SELINOCARPUS A. Gray

1. **Selinocarpus diffusus nevadensis** Standl. Contr. U. S. Nat. Herb. 12: 388. 1909.
Hillsides of the Covillea belt, southern Utah and Nevada.

2. HERMIDIUM S. Wats.

1. **Hermidium alipes** S. Wats. in King, Geol. Expl. 40th Par. 5: 286. *pl. 32.* 1871.
Mesas and low foothills of the artemisia belt. Western Nevada and California.

3. ANULOCAULIS Standl.

Flowers 5 to 9 mm. long; throat of perianth narrow; fruit with rounded apex. ..... 1. A. annulatus.
Flowers about 20 mm. long; throat of perianth nearly rotate; fruit turbinate, truncate ..... 2. A. leiosolenus.

1. Anulocaulis annulatus (Coville) Standl. Contr. U. S. Nat. Herb. 12: 375. 1909.

Boerhaavia annulata Coville, Contr. U. S. Nat. Herb. 4: 177. *pl. 18.* 1893.

Canyons and slopes of the Covillea belt. Southern Nevada and California.

2. Anulocaulis leiosolenus (Torr.) Standl. Contr. U. S. Nat. Herb. 12: 375. 1909.

Boerhaavia leiosolena Torr. U. S. & Mex. Bound. Bot. 172. 1859.

Plains and hillsides of the Covillea belt. Western Texas to southern Nevada.

4. BOERHAAVIA L.

1. Boerhaavia wrightii A. Gray, Amer. Journ. Sci, II. 15: 322. 1853.

Plains of the Covillea belt. Western Texas to southern Nevada.

5. TRIPTEROCALYX Hook.

Body of fruit sparsely villous, transversely wrinkled or ribbed, the ribs extending into the wings ..... 1. T. crux-maltae.
Body of fruit glabrous or sparsely puberulent, the ribs longitudinal.
  Body of fruit longitudinally costate; peduncles long, often longer than the subtending leaves; stems glabrous, or nearly so ..... 2. T. pedunculatus.
  Body of fruit not costate; peduncles always shorter than the leaves; stems densely pubescent ..... 3. T. micranthus.

1. Tripterocalyx crux-maltae (Kellogg) Standl. Contr. U. S. Nat. Herb. 12: 328. 1909.

Abronia crux-maltae Kellogg, Proc. Calif. Acad. 2: 71. 1863.

Plains and hillsides of the artemisia belt. Nevada and California.

2. Tripterocalyx pedunculatus (Jones) Standl. Contr. U. S. Nat. Herb. 12: 328. 1909.

Abronia micrantha pedunculata Jones, Proc. Calif. Acad. II. 5: 716. 1895.

Plains and hillsides of the Covillea and artemisia belts. Utah and Arizona.

3. Tripterocalyx micranthus (Torr.) Hook. Journ. Bot. Kew Misc. 5: 261. 1853.

Abronia micrantha Torr. in Frém. Rep. Exped. Rocky Mount. 96. 1845.

Plains and hillsides of the artemisia belt. Montana to Kansas and Arizona.

6. ABRONIA Juss. SANDVERBENA

Plants cespitose, with short branched caudices. Leaf blades oval, 8 to 20 mm. long; flowers white, 12 to 14 mm. long; bracts oblong, obtuse; fruit turbinate, winged ..... 2. A. nana.
Plants not cespitose, the stems long.
  Bracts small, lanceolate, acute or acuminate.
    Flowers about 10 mm. long, purplish red; leaves broadly lanceolate. Fruit biturbinate, crested or somewhat winged ..... 7. A. pumila.
    Flowers 15 to 20 mm. long, purple or purplish red; leaf blades broadly ovate to oblong, 1 to 4 cm. long.

Plants glabrous, at least below; fruit deeply lobed, the lobes compressed and acute_____3. A. turbinata.
Plants densely villous; fruit turbinate, broad-winged__1. A. villosa.
Bracts usually large and broad, ovate and acutish or obovate.
Flowers 10 to 14 mm. long, red to white.
Bracts about 4 mm. long; fruit not winged; leaves cordate-ovate to elliptic; annual_____4. A. exalata.
Bracts 5 to 8 mm. long; fruit with narrow thin wings; leaves orbicular to elliptical; perennial_____9. A. orbiculata.
Flowers 18 mm. long or more. Perennials.
Stems puberulent or glabrous. Leaves mostly oval or oblong; flowers greenish white; fruit obpyramidal, winged_____8. A. elliptica.
Stems copiously villous or short-villous, at least above. Bracts 10 to 15 mm. long; leaf blades ovate to elliptic, 3 to 6 cm. long.
Fruit whitish stramineous, turbinate, often as broad as long, the winglike lobes dilated at apex and flat-topped____5. A. salsa.
Fruit dark olivaceous or brownish, usually biturbinate, much longer than broad, the lobes compressed and thin-edged throughout. 6. A. fragrans.

1. **Abronia villosa** S. Wats. Amer. Nat. 7: 302. 1873.
Desert areas and dry hillsides of the Covillea belt. Southwestern Utah, Arizona, Nevada, and southern California.

2. **Abronia nana** S. Wats. Proc. Amer. Acad. 14: 294. 1879.
Rocky slopes and canyons of the artemisia, pinyon, and yellow pine belts. Southern Utah and Arizona to southern California.

3. **Abronia turbinata** Torr.; S. Wats. in King, Geol. Expl. 40th Par. 5: 285. *pl. 31.* 1871.
Desert areas and hillsides of the artemisia belt. Nevada, California, and Oregon.

4. **Abronia exalata** Standl. Contr. U. S. Nat. Herb. 12: 318. 1909.
Desert areas and hillsides of the Covillea and artemisia belts. Nevada and California.

5. **Abronia salsa** Rydb. Bull. Torrey Club 29: 684. 1902.
Desert areas and dry hillsides of the artemisia belt. Utah.

6. **Abronia fragrans** Nutt.; Hook. Journ. Bot. Kew Misc. 5: 261. 1853.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. South Dakota to Kansas and New Mexico, westward to Montana and Idaho.

7. **Abronia pumila** Rydb. Bull. Torrey Club 29: 683. 1902.
Hillsides and canyons of the artemisia and pinyon belts. Utah.

8. **Abronia elliptica** A. Nels. Bull. Torrey Club 26: 7. 1899.
Plains and hillsides of the Covillea, artemisia, and pinyon belts. Wyoming to Arizona and eastern Nevada.

9. **Abronia orbiculata** Standl. Contr. U. S. Nat. Herb. 12: 322. 1909.
Plains and hillsides of the Covillea belt. Nevada.

7. WEDELIELLA Cockerell

1. **Wedeliella incarnata** (L.) Cockerell, Torreya 9: 167. 1909.
Allionia incarnata L. Syst. Nat. ed. 10. 890. 1759.
Plains and hillsides of the Covillea and artemisia belts. Colorado and Utah to Texas, Mexico, and South America.

8. ALLIONIA Loefl.

Leaves petiolate, deltoid or ovate-deltoid----------1. A. pumila.
Leaves sessile or nearly so, linear.
  Fruit and inflorescence glabrous----------2. A. glabra.
  Fruit and inflorescence pubescent----------3. A. linearis.

1. Allionia pumila Standl. Contr. U. S. Nat. Herb. 12: 345. 1909.

Hillsides and in canyons of the Covillea belt. Southeastern Nevada and Arizona.

2. Allionia glabra (S. Wats.) Kuntze, Rev. Gen. Pl. 2: 533. 1891.

Oxybaphus glaber S. Wats. Amer. Nat. 7: 302. 1873.

Plains and hillsides of the artemisia belt. Texas to southern Utah and Arizona.

3. Allionia linearis Pursh, Fl. Amer. Sept. 728. 1814.

Plains and hillsides of the artemisia belt. South Dakota to Missouri, Texas, Arizona, and Utah.

9. HESPERONIA Standl.

1. Hesperonia retrorsa (Heller) Standl. N. Amer. Fl. 21: 236. 1918.

Mirabilis retrorsa Heller, Muhlenbergia 2: 193. 1906.

Among rocks, in canyons, and on hillsides of the Covillea and artemisia belts. California and Nevada.

10. ALLIONIELLA Rydb.

1. Allioniella oxybaphoides (A. Gray) Rydb. Bull. Torrey Club 29: 688. 1902.

Quamoclidion oxybaphoides A. Gray, Amer. Journ. Sci. II. 15: 320. 1853.

Plains and hillsides of the artemisia and pinyon belts. Colorado, Utah, New Mexico, and Arizona.

11. QUAMOCLIDION Choisy

Perianth glandular-villous outside; fruit olive and brown, with 10 light-colored vertical lines----------1. Q. froebelii.
Perianth glabrous or sparsely puberulent; fruit dark brown to black.
  2. Q. multiflorum.

1. Quamoclidion froebelii (Behr) Standl. Contr. U. S. Nat. Herb. 12: 359. 1909.

Oxybaphus froebelii Behr, Proc. Calif. Acad. 1: 72. 1855.

Valleys and canyons of the Covillea and artemisia belts. Western Nevada, southern California, and northern Lower California.

2. Quamoclidion multiflorum Torr.; A. Gray, Amer. Journ. Sci. II. 15: 321. 1853.

Valleys and canyons of the Covillea and artemisia belts. Colorado and Utah, southward to Texas and Mexico.

39. AIZOACEAE. Carpetweed Family

Prostrate or erect, slender annuals; leaves in our species opposite or verticillate, without stipules; flowers axillary or terminal, mostly 5-merous; sepals free or united; corolla none in our species; ovary 1 to 5-celled; seeds numerous.

Leaves verticillate, linear-oblanceolate to narrowly obovate, 1 to 4 cm. long; sepals oblong, distinct, 2 mm. long, scarious; capsule oblong, 3 to 5 mm. long, 3-celled----------1. MOLLUGO.

Leaves opposite, obovate to linear-oblanceolate, 1 to 4 cm. long or more, fleshy; sepals united below, about 6 mm. long; capsule 3 to 5-celled; plants prostrate ..... 2. SESUVIUM.

1. MOLLUGO L. Carpetweed

1. **Mollugo verticillata** L. Sp. Pl. 89. 1753.

Fields and waste places; Arizona. Throughout most of North America; also in the Old World.

2. SESUVIUM L. Seapurslane

1. **Sesuvium sessile** Pers. Syn. Pl. 2: 39. 1806.

Valleys and desert areas of the Covillea belt. Kansas to California, southward to tropical America.

40. PORTULACACEAE. Purslane Family

More or less succulent herbs; leaves simple, entire, alternate or opposite; flowers solitary, racemose or in cymes, perfect; sepals 2 or 6 to 8; petals 4 or 5, rarely none; stamens as many as the petals; styles or style branches 2 to 5; ovary 1-celled, the placentae central or basal; fruit a valvate or circumscissile capsule.

Sepals 6 to 8, round-oval, persistent, 15 mm. long. Petals 12 or more, oval or spatulate, rose-colored to purplish, 1.5 to 3 cm. long; low acaulescent perennial with terete leaves 1 to 4 cm. long; scapes jointed and bracted near the middle; capsules circumscissile ..... 8. LEWISIA.

Sepals 2.

Flowers in dense headlike clusters. Petals 4, unequal; stamens 3; styles 2; capsule 2-valved; cespitose biennials or perennials with mostly rosulate leaves ..... 3. SPRAGUEA.

Flowers solitary, paniculate, or racemose, not in dense clusters.

Ovary partly inferior. Style branches 3 to 8; stamens 8 or more; petals fugacious, 4 to 6; capsule circumscissile; annuals or perennials with ascending or prostrate stems 10 to 60 cm. long ..... 7. PORTULACA.

Ovary wholly superior.

Low perennials, acaulescent or nearly so, from a more or less stout taproot. Leaves fleshy; scapes 1 to few-flowered; petals 3 to 10; stamens 5 to 20; capsule circumscissile, many-seeded. 2. OREOBROMA.

Plants annuals or perennials with leafy stems.

Stem leaves 2, opposite, or 3 or 4 and verticillate.

Stem leaves linear-filiform, 2 to 4, 1 to 5 cm. long; petals 3 to 10, oblong; capsule circumscissile, conical. Perennial, 2 to 10 cm. high, with globular corm ..... 9. EROCALLIS.

Stem leaves commonly 2, of a broader type; styles 3; capsule 3-valved; ovules 3 to 6 ..... 5. CLAYTONIA.

Stem leaves numerous.

Plants perennial herbs with fleshy rootstocks. Leaves commonly alternate, linear; flowers axillary, or terminal in cymes; petals 5; stamens 5 or more; styles 3; capsule 3-valved ..... 1. TALINUM.

Plants annuals or perennials with slender roots.

Petals 2, more or less united at apex (withering-persistent on the linear capsule). Stamen 1; style short, bifid; plants with numerous stems, 5 to 20 cm. long; leaves spatulate, 3 cm. long or less, alternate ..... 4. CALYPTRIDIUM.

Petals 5. Styles and ovules 3; capsules 3-valved, 2 or 3-seeded; inflorescence racemose ..... 6. MONTIA.

1. TALINUM Adans.

1. **Talinum brevifolium** Torr. in Sitgreaves, Rep. Zuñi & Colo. 156. 1854.
Talinum brachypodum S. Wats. Proc. Amer. Acad. 20: 355. 1885.
Mesas and dry hillsides of the artemisia belt. Southern Utah, Arizona, and New Mexico.

2. OREOBROMA Howell

Bracts 2, sepaloid, subtending the calyx. Sepals oval, about 6 mm. long; petals 7 to 9, obovate-cuneate, white, 1 cm. long or more; leaves spatulate or oblanceolate, 3 to 7 cm. long, the petioles margined--1. O. brachycalyx.
Bracts distant, not subtending the calyx.
Sepals erose-denticulate, round-ovate, short-pointed; petals 6 to 8, white or pinkish, 1 cm. long or less; leaves linear, 2 to 7 cm. long, exceeding the scapes----2. O. pygmaeum.
Sepals entire or nearly so, round-ovate, scarious-margined, 1 cm. long (in fruit); petals white, 1 cm. long or more; leaves linear, 5 to 10 cm. long, equaling the scape----3. O. nevadense.

1. **Oreobroma brachycalyx** (Engelm.) Howell, Erythea 1: 31. 1893.
Lewisia brachycalyx Engelm.; A. Gray, Proc. Amer. Acad. 7: 400. 1868.
Rocky places of the pinyon and yellow pine belts. Southern Utah (?) and Arizona to southern California.

2. **Oreobroma pygmaeum** (A. Gray) Howell, Erythea 1: 33. 1893.
Talinum pygmaeum A. Gray, Amer. Journ. Sci. II. 33: 407. 1862.
Spruce and alpine belts. Montana to Colorado, westward to Washington and California.

3. **Oreobroma nevadense** (A. Gray) Howell, Erythea 1: 33. 1893.
Calandrinia nevadensis A. Gray, Proc. Amer. Acad. 8: 623. 1873.
Yellow pine, aspen, and spruce belts. Washington to California, eastward to Colorado and New Mexico.

3. SPRAGUEA Torr. PUSSYPAWS

Flowering stems more or less leafy; leaves spatulate to oblanceolate, 1 to 5 cm. long or more, the cauline smaller; inflorescence capitate-glomerate to umbellate; sepals scarious, white to purple----1. S. umbellata.
Flowering stems commonly with 1 to 2 scarious bracts (otherwise leafless), depressed; leaves 6 to 12 mm. long (except on young plants), oblanceolate; inflorescence commonly capitate; sepals as in the preceding----2. S. nuda.

1. **Spraguea umbellata** Torr. Pl. Frem. 4. *pl. 1.* 1853.
Spraguea paniculata Kellogg, Proc. Calif. Acad. 2: 187. *f. 56.* 1863.
Foothills and canyons of the yellow pine and aspen belts. Nevada and California.

2. **Spraguea nuda** (Greene) Howell, Erythea 1: 39. 1893.
Calyptridium nudum Greene, Pittonia 1: 64. 1887.
Aspen, spruce, and alpine belts. Western Utah to California.

4. CALYPTRIDIUM Nutt.

Racemes scorpioid, paniculate; capsule 3 to 4 times as long as the calyx. 1. C. monandrum.
Racemes not scorpioid, paniculate; capsule scarcely surpassing the calyx. 2. C. roseum.

1. Calyptridium monandrum Nutt.; Torr. & Gray, Fl. N. Amer. 1: 193. 1838.

Desert areas, hillsides, and canyons of the Covillea and artemisia belts. Southern Nevada, Arizona, and southern California.

2. Calyptridium roseum S. Wats. in King, Geol. Expl. 40th Par. 5: 44. *pl. 6, f. 6–8.* 1871.

Valleys and on hillsides of the Covillea and artemisia belts. Southern Oregon, Nevada, and California.

5. CLAYTONIA L. Springbeauty

Plants perennials with corms or fleshy roots.

Basal leaves numerous, spatulate to orbicular, on margined petioles. Stem leaves spatulate; petals pink or white, purple-veined, 6 mm. long or more; root stout, 1 to 4 cm. thick ..... 3. C. megarrhiza.

Basal leaves few, spatulate to oblanceolate. Corms 10 to 15 mm. diameter.

Petals obcordate, rose-colored, purple-veined; stem leaves oblong-lanceolate, sessile, 2 to 5 cm. long, 3-ribbed ..... 1. C. lanceolata.

Petals oval or oblong, pink; stem leaves lanceolate, 2 to 5 cm. long, sessile ..... 2. C. rosea.

Plants annuals or perennials with slender roots or scaly rootstocks.

Basal leaves linear to narrowly spatulate.

Racemes elongate, 5 cm. long or more. Petals pink or white, small; stem leaves connate, forming a round disk ..... 7. C. parviflora.

Racemes short, dense.

Stem leaves linear, connate on one side, equaling the raceme. Petals obcordate, exceeding the sepals; plants 2 to 8 cm. high. 4. C. exigua.

Stem leaves broader; annuals, 2 to 15 cm. high.

Stem leaves ovate to lanceolate, connate on one side, 1 cm. long or less; petals ovate, entire, equaling the sepals ..... 5. C. spathulata.

Stem leaves ovate, connate on one side, forming a 2-lobed disk, 1 to 2 cm. broad ..... 6. C. utahensis.

Basal leaves broader, deltoid to ovate or orbicular.

Stem leaves not united. Petals obcordate, white or pink, 6 mm. long or more.

Pedicels mostly bractless; leaf blades reniform to rhombic-ovate, 8 cm. long or less; perennial, 20 to 30 cm. high, with scaly rootstocks. 8. C. asarifolia.

Pedicels mostly bracted; leaf blades rhombic-ovate to lanceolate, 2 to 5 cm. long; annual or sometimes perennial, 10 to 40 cm. high. 9. C. sibirica.

Stem leaves more or less united (connate). Basal leaves rhombic-ovate to reniform.

Racemes short, commonly not exceeding the stem leaves, the latter united on one side; sepals about 2 mm. long; petals 4 mm. long. 10. C. rubra.

Racemes elongate; stem leaves united, forming a rounded 2-lobed cup; sepals orbicular, 3 to 4 m. long; petals exceeding the sepals. 11. C. perfoliata.

1. Claytonia lanceolata Pursh, Fl. Amer. Sept. 175. 1814.

Aspen, spruce, and subalpine belts. Saskatchewan to New Mexico, westward to British Columbia and California.

2. Claytonia rosea Rydb. Bull. Torrey Club **31**: 404. 1904.
Yellow pine, aspen, and spruce belts. Wyoming, Colorado, and Utah.

3. Claytonia megarrhiza (A. Gray) Parry; S. Wats. Bibl. Ind. 118. 1878.
Claytonia arctica megarrhiza A. Gray, Amer. Journ. Sci. II. **33**: 406. 1862.
Spruce and alpine belts. Washington and Alberta to northern New Mexico.

4. Claytonia exigua Torr. & Gray, Fl. N. Amer. **1**: 200. 1838.
Canyons and hillsides of the artemisia belt. British Columbia to California and Nevada.

5. Claytonia spathulata Dougl.; Hook. Fl. Bor. Amer. **1**: 226. *pl.* 74. 1833.
Open and saline ground of the artemisia belt; perhaps confined to the Pacific coast region. British Columbia to California and Utah.

6. Claytonia utahensis (Rydb.) Tidestrom.
Limnia utahensis Rydb. Bull. Torrey Club **39**: 314. 1912.
Artemisia belt. Southern Utah, Nevada, and Arizona.

7. Claytonia parviflora Dougl.; Hook. Fl. Bor. Amer. **1**: 225. *pl.* 73. 1834.
Valleys and open forests, upward to 2,400 meters; eastern Oregon. Perhaps outside our range. Alaska to Montana and California.

8. Claytonia asarifolia Bong. Mém. Acad. St. Pétersb. VI. **2**: 137. 1832.
Canyons and forest areas of the aspen and spruce belts. Montana to Utah, westward to Alaska and California.

9. Claytonia sibirica L. Sp. Pl. 204. 1753.
Yellow pine belt, upward to the subalpine belt; Idaho. Alaska to California, Montana, and Utah (?).

10. Claytonia rubra (Howell) Tidestrom.
Claytonia parviflora depressa A. Gray, Proc. Amer. Acad. **22**: 281. 1887.
Montia rubra Howell, Erythea **1**: 38. 1893.
River banks and canyons of the artemisia, pinyon, and yellow pine belts. South Dakota to Colorado, westward to British Columbia and California.

11. Claytonia perfoliata Donn; Willd. Sp. Pl. **1**[2]: 1186. 1797.
Moist shady places of the yellow pine, aspen, and spruce belts. Montana to Alaska, southward to Utah and California.

6. MONTIA L.

Leaves opposite, spatulate to oblanceolate, 1 to 4 cm. long; perennial, 5 to 30 cm. high. Petals white or rose-colored, 6 to 8 mm. long. **1. M. chamissoi.**

Leaves alternate; annuals, 10 to 30 cm. high.
- Leaves narrowly linear, 2 to 4 cm. long; petals white, little exceeding the calyx, 4 to 5 mm. long **2. M. linearis.**
- Leaves spatulate to oblanceolate, 5 to 20 mm. long; petals rose-colored or white, 8 to 10 mm. long, much exceeding the sepals **3. M. parvifolia.**

1. Montia chamissoi (Ledeb.) Tidestrom.
Claytonia chamissoi Ledeb.; Spreng. Syst. Veg. **1**: 790. 1825.
Claytonia chamissonis Eschsch. Linnea **6**: 562. 1831.
Montia chamissonis Greene, Fl. Franc. 180. 1891.
Valleys and moist ravines of the artemisia belt, upward to the spruce belt. Alaska to Minnesota, New Mexico, and California.

2. Montia linearis (Dougl.) Greene, Fl. Franc. 181. 1891.
Claytonia linearis Dougl.; Hook. Fl. Bor. Amer. **1**: 224. *pl.* 71. 1834.
Moist places of the artemisia, pinyon, and yellow pine belts. Montana to British Columbia, California and Nevada.

3. Montia parvifolia (Moc.) Greene, Fl. Franc. 181. 1891.
Claytonia parvifolia Moc.; DC. Prodr. 3: 361. 1828.
Moist places of the yellow pine, aspen, and spruce belts. Alaska to Montana, Nevada, and California.

7. PORTULACA L. Purslane

Leaf blades terete or nearly so, 1 cm. long or less, villous in the axils; petals carmine or purplish, retuse, 3 to 4 mm. long. Plant diffusely branched from the base ..... 3. P. pilosa.
Leaf blades flat, glabrous, cuneate to spatulate-obovate, 1 to 3 cm. long; petals yellow, emarginate.
Sepals acute; stamens 7 to 12; styles 5 to 7; leaves rounded or truncate. 1. P. oleracea.
Sepals obtuse; stamens 7 to 19; styles 3 or 4; leaves often retuse. 2. P. retusa.

1. Portulaca oleracea L. Sp. Pl. 445. 1753.
Waste places; introduced from the Old World. Throughout the United States, Mexico, and the West Indies.

2. Portulaca retusa Engelm. Bost. Journ. Nat. Hist. 6: 154. 1850.
Sandy places of the Covillea belt, upward to the yellow pine belt. Arkansas and Texas to Arizona and southern Utah.

3. Portulaca pilosa L. Sp. Pl. 445. 1753.
Sandy places of the Covillea belt; Arizona, possibly extending into southern Nevada. Florida to Missouri, Texas, and southern California.

8. LEWISIA Pursh

1. Lewisia rediviva Pursh, Fl. Amer. Sept. 368. 1814. Bitterroot.
Yellow pine, aspen, spruce, and subalpine belts. Montana to Colorado, westward to British Columbia and California.
This is the State flower of Montana.

9. EROCALLIS Rydb.

1. Erocallis triphylla (S. Wats.) Rydb. Bull. Torrey Club 33: 140. 1906.
Claytonia triphylla S. Wats. Proc. Amer. Acad. 10: 345. 1875.
Spruce and subalpine belts. Wyoming and Colorado, westward to Washington and California.

41. CORRIGIOLACEAE. Whitlow-wort Family

Small annuals or perennials with opposite leaves and scarious stipules; flowers inconspicuous; calyx 4 or 5-toothed or parted; corolla minute or none; stamens borne on the calyx and mostly opposite the lobes; styles or style branches 2; fruit a 1-seeded utricle.

Calyx 5-cleft, persistent, 10-ribbed; stamens and staminodia 15, inserted at the summit of the calyx tube; petals none; style bifid: utricle included, 1-seeded; prostrate or erect annuals or perennials, not cespitose. 1. ACHYRONYCHIA.
Calyx of 5 narrow awn-tipped sepals; stamens 5, alternating with 5 small staminodia, hypogynous; styles partially united; utricle included, 1-seeded; plants low, pulvinate-cespitose ..... 2. PARONYCHIA.

1. ACHYRONYCHIA Torr. & Gray

Diffuse glabrous annual; stems 15 cm. long or less; leaves oblanceolate, obtuse, 15 mm. long or less ..... 1. A. cooperi.
Plant erect, glabrous, glaucous, perennial, from a stout root; stems 15 cm. high or less; leaves linear, fleshy, 10 to 15 mm. long ..... 2. A. rixfordii.

1. Achyronychia cooperi Torr. & Gray, Proc. Amer. Acad. 7: 331. 1868.

Desert areas of the Covillea belt; Needles, California. Southern California and Arizona to Mexico.

2. Achyronychia rixfordii T. S. Brandeg. Zoe 1: 230. 1890.

Rocky places of the artemisia belt. Nevada and southern California.

2. PARONYCHIA Adans.

Leaves elliptic, acute, thick, puberulent, 3 to 5 mm. long; flowers solitary, axillary; sepals ovate, scarious-margined, 3 mm. long; plants densely cespitose, 3 to 5 cm. high, with ovate silvery stipules ..... 1. P. pulvinata.
Leaves linear, spinulose-tipped, puberulent, 4 to 6 mm. long; flowers axillary, solitary or subcymose; plants depressed, cespitose, 10 cm. high or less; stipules 2-cleft ..... 2. P. sessiliflora.

1. Paronychia pulvinata A. Gray, Proc. Acad. Phila. **1863:** 58. 1864.

Subalpine and alpine belts, Uintah Mountains, Utah. Wyoming to New Mexico and Utah.

2. Paronychia sessiliflora Nutt. Gen. 1: 160. 1818.

Paronychia sessiliflora brevicuspis A. Nels. Bull. Torrey Club **26:** 237. 1899.

On rocks, in canyons and on ridges of the pinyon belt, upward to the spruce belt. Saskatchewan and Alberta to Nevada and Texas.

42. SILENACEAE. Pink Family

Annual or perennial herbs; leaves opposite, with or without stipules; flowers solitary, cymose, or in umbels, 4 or 5-merous; stamens twice as many as the sepals or fewer; styles 2 to 5, distinct; ovary superior, mostly 1-celled, with central placenta; fruit a capsule; seeds numerous.

Calyx tubular, 5-toothed or lobed. Petals unguiculate.
  Calyx conspicuously 5-angled, ovoid, inflated, 12 mm. long. Petals purple, without a crown; glabrous annual, 0.3 to 1 meter high; leaves ovate to lanceolate, 2 to 8 cm. long ..... 11. VACCARIA.
  Calyx ribs 10 or at least twice as many as the teeth.
    Calyx lobes foliaceous, 1 to 2.5 cm. long, linear, exceeding the ovoid tube. Petals red, 15 to 20 mm. long; pubescent annual, 0.3 to 1 meter high; leaves linear-lanceolate, 5 to 10 cm. long ..... 8. AGROSTEMMA.
    Calyx lobes or teeth not foliaceous, mostly very short.
      Styles 2. Plant glabrous, 30 to 60 cm. high; leaves ovate to oval, 8 cm. long or less; calyx 15 to 20 mm. long; petals obcordate, pink or white, large ..... 12. SAPONARIA.
      Styles 3 to 5. Calyx mostly 10-ribbed.
        Styles normally 3; petals appendaged; capsule opening by 3 to 6 teeth. 9. SILENE.
        Styles 5; petals with or without appendages; capsule opening by 10 teeth ..... 10. LYCHNIS.
Calyx of free or nearly free sepals.
  Stipules present. Leaves linear-filiform, 1 to 5 cm. long; flowers in terminal cymes, 5-merous; petals pink or white, entire.

Leaves opposite; styles 3; capsule 3-valved; low spreading annuals or perennials_____7. TISSA.

Leaves whorled; styles 5; capsule 5-valved; glabrous or villous annuals, 15 to 50 cm. high_____6. SPERGULA.

Stipules none.

Petals 2-cleft or parted.

Styles normally 3; capsule short-ovate_____1. ALSINE.

Styles normally 5; capsule long-cylindric, opening by 10 teeth. 2. CERASTIUM.

Petals entire or emarginate (bifid in species of *Arenaria*).

Styles as many as the sepals and alternate with them. Low matted annuals or perennials; leaves filiform, 5 to 15 mm. long; flowers pediceled, axillary, 4 or 5-merous; petals white_____3. SAGINA.

Styles fewer than the sepals, or if of the same number, opposite them.

Flowers terminal or cymose; seeds not appendaged at hilum; leaves mostly subulate or linear (broader in two species). 4. ARENARIA.

Flowers mostly solitary and axillary; seed appendaged at hilum; leaves broad_____5. MOEHRINGIA.

1. ALSINE L. CHICKWEED

Stems and inflorescence more or less glandular, viscid, or pubescent.

Leaves linear-lanceolate to lanceolate, 5 to 12 cm. long, sessile, acuminate.

Sepals oblong, 3 to 5 mm. long, the retuse petals twice longer; plants viscid, 20 to 60 cm. high_____1. A. jamesiana.

Leaves ovate to ovate-lanceolate.

Stems pubescent in lines (at least above), 10 to 30 cm. high; leaves ovate, conspicuously petioled (except the uppermost), 5 mm. long or more; sepals glandular-pubescent, exceeding the petals__2. A. media.

Stems with scattered pubescence; leaves ovate-lanceolate, more or less ciliolate, 5 to 15 mm. long, sessile; sepals lanceolate, acute; petals none_____13. A. calycantha.

Stems and inflorescence glabrous.

Branches of inflorescence reflexed or divaricate, filiform, 1 to 5 cm. long.

Leaves oblong-lanceolate, 2 cm. long or less; sepals scarious; petals minute or none_____4. A. baicalensis.

Branches of inflorescence ascending or erect. Petals bifid.

Floral bracts small, scarious, or leaflike and plant few-flowered. Perennials.

Petals small or wanting; leaves linear to lanceolate.

Stem leaves 1 cm. long or less (the basal ovate and petioled); plants erect, 10 to 20 cm. high_____3. A. nitens.

Stem leaves 2 to 4 cm. long; plants 20 to 40 cm. high. 5. A. alpestris.

Petals equaling or exceeding the sepals; leaves narrowly lanceolate to linear. Stems angled.

Sepals ovate, obtuse or mucronate, broadly scarious-margined, the capsule twice longer_____7. A. longipes.

Sepals lanceolate, sharply acute, scarious-margined.

Stems 20 to 50 cm. high; leaves 2 to 4 cm. long__6. A. strictiflora.

Stems 5 to 15 cm. high (rarely higher); leaves 1 to 2 cm. long, bluish green_____8. A. laeta.

Floral bracts leaflike.
Petals equaling or exceeding the sepals.
Leaves ovate to ovate-lanceolate, 2 to 5 mm. long. Stems diffuse, 5 cm. high or less_____14. A. palmeri.
Leaves linear to oblong-lanceolate.
Plants low; leaves linear to narrowly lanceolate_____8. A. laeta.
Plants with weak stems, 20 to 40 cm. long; leaves lanceolate to oblong-lanceolate, 6 to 20 mm. long. Sepals ovate-lanceolate, acuminate, exceeded by the sepals_____9. A. crassifolia.
Petals half as long as the sepals or wanting.
Leaves oblong-lanceolate, 1 to 4 cm. long. Sepals ovate-lanceolate, 4 mm. long; stems erect, 15 to 40 cm. high____10. A. borealis.
Leaves ovate to ovate-lanceolate, 2 cm. long or less. Plants prostrate or decumbent.
Sepals ovate, obtuse, shorter than the capsule. Leaves 1 cm. long or less_____11. A. obtusa.
Sepals acute, scarious.
Stems weak, 10 to 30 cm. long; leaves thin, crisp-margined. 12. A. crispa.
Stems diffuse, 3 to 10 cm. long; leaves thick. 15. A. polygonoides.

1. **Alsine jamesiana** (Torr.) Heller, Cat. N. Amer. Pl. ed. 2. 4. 1900.
Stellaria jamesiana Torr. Ann. Lyc. N. Y. 2: 169. 1828.
Alsine curtisii Rydb. Bull. Torrey Club 28: 274. 1901.
Aspen and spruce belts. Wyoming to New Mexico, California, and Washington.

2. **Alsine media** L. Sp. Pl. 272. 1753.
Stellaria media Cyrill. Char. Comm. 36. 1784.
About settlements; introduced from Europe. Throughout most of North America.

3. **Alsine nitens** (Nutt.) Greene, Man. Bay Reg. 33. 1894.
Stellaria nitens Nutt.; Torr. & Gray, Fl. N. Amer. 1: 185. 1838.
Dry hillsides of the artemisia, pinyon, and yellow pine belts. Montana to Utah, westward to British Columbia and California.

4. **Alsine baicalensis** Coville, Contr. U. S. Nat. Herb. 4: 70. 1893.
Aspen, spruce, and alpine belts. Montana to New Mexico and California.

5. **Alsine alpestris** (Fries) Rydb. Bull. Torrey Club 39: 315. 1912.
Stellaria alpestris Fries, Mant. 1: 10. 1832.
Alsine brachypetala Howell, Fl. Northw. Amer. 82. 1897.
Aspen and spruce belts. Ontario to Alaska, southward to Colorado, Utah, and California; also in northern Europe and Asia.

6. **Alsine strictiflora** Rydb. Bull. Torrey Club 39: 315. 1912.
Wet canyons, upward to the spruce belt. Ontario to British Columbia, southward to Colorado and California.

7. **Alsine longipes** (Goldie) Coville, Contr. U. S. Nat. Herb. 4: 70. 1893.
Stellaria longipes Goldie, Edinburgh Phil. Journ. 6: 327. 1822.
Yellow pine, aspen, and spruce belts. Greenland to Alaska, southward to Colorado and California.

8. Alsine laeta (Richards.) Rydb. Mem. N. Y. Bot. Gard. **1**: 144. 1900.
Stellaria laeta Richards. Bot. App. Frankl. Journ. 738. 1823.
Canyons and mountain meadows of the spruce and alpine belts. Arctic regions, southward to New Mexico and California.

9. Alsine crassifolia (Ehrh.) Britton, Mem. Torrey Club **5**: 150. 1894.
Stellaria crassifolia Ehrh. Hannov. Mag. **8**: 116. 1784.
Spruce and alpine belts; Colorado Plateau. Labrador to Alberta, southward to Colorado and Utah (?).

10. Alsine borealis (Bigel.) Britton, Mem. Torrey Club **5**: 149. 1894.
Stellaria borealis Bigel. Fl. Bost. ed. 2. 182. 1824.
Aspen and spruce belts. Labrador to Alaska, southward to New Jersey, Colorado, and California.

11. Alsine obtusa (Engelm.) Rose, Contr. U. S. Nat. Herb. **3**: 569. 1896.
Stellaria obtusa Engelm. Bot. Gaz. **7**: 5. 1882.
Spruce belt. Alberta to Washington, southward to Colorado and Utah.

12. Alsine crispa (Cham. & Schlecht.) Holzinger, Contr. U. S. Nat Herb. **3**: 216. 1895.
Stellaria crispa Cham. & Schlecht. Linnaea **1**: 51. 1826.
Aspen and spruce belts of territory adjacent to the Great Basin; northern and western Nevada (?). Alaska to Wyoming and California.

13. Alsine calycantha (Ledeb.) Rydb. Bull. Torrey Club **24**: 244. 1897.
Arenaria calycantha Ledeb. Mém. Acad. St. Pétersb. **5**: 534. 1812.
Spruce and alpine belts. Alaska to Montana, Colorado, and California; Siberia.

14. Alsine palmeri Rydb. Bull. Torrey Club **39**: 315. 1912.
Valleys of the artemisia and pinyon belts. Southern Utah.

15. Alsine polygonoides Greene; Rydb. Colo. Agr. Exp. Sta. Bull. **100**: 128. 1906.
Spruce and alpine belts. Colorado and Utah.

2. CERASTIUM L.

Petals equaling or scarcely exceeding the sepals.
Plant annual.
Leaves elliptic to oval, very obtuse, 12 mm. long or less, sessile or the lowest petioled; capsule 1 to 2 times longer than the calyx; plants pubescent, 7 to 20 cm. high, with densely clustered flowers__**1. C. viscosum.**
Leaves oblanceolate or oblong, 1 to 3 cm. long, obtuse; capsule 2 to 3 times as long as the calyx; plants 10 to 30 cm. high, with flowers in open cymes_____**3. C. brachypodum.**
Plant perennial, cespitose, 10 to 40 cm. high. Cymes loose; leaves oblong or elliptic, 1 to 3 cm. long; sepals 5 mm. long, obtuse, scarious; capsule 1 to 2 times longer than the calyx_____**2. C. vulgatum.**
Petals conspicuously longer than the sepals.
Plants annual, 20 to 50 cm. high, with long internodes. Leaves oblong-lanceolate or oblanceolate, 2 to 7 cm. long; pedicels in fruit 1 to 2 cm. long; capsule twice longer than the calyx_____**4. C. nutans.**
Plants perennial.
Leaves oblong or oblanceolate, 5 to 30 mm. long. Sepals 5 to 7 mm. long; petals 7 to 8 mm. long; stems 5 to 25 cm. high ____**5. C. beeringianum.**

Leaves (at least the lower pairs) linear to linear-lanceolate, 1 to 3 cm. long. Petals 8 to 10 mm. long, twice longer than the glandular calyx. **6. C. strictum.**

1. Cerastium viscosum L. Sp. Pl. 437. 1753.

About settlements; Idaho; introduced from Europe. Throughout United States and Canada.

2. Cerastium vulgatum L. Sp. Pl. ed. 2. 627. 1762.

About settlements and in foothills; introduced from Europe. Throughout United States, Canada, and Alaska.

3. Cerastium brachypodum (Engelm.) Robinson in Britton, Mem. Torrey Club **5**: 150. 1894.

Cerastium nutans brachypodum Engelm.; A. Gray, Man. ed. 5. 94. 1867.

Plains and canyons, upward to 2,000 meters. South Dakota to Alberta, southward to Missouri, Texas, and Mexico.

4. Cerastium nutans Raf. Préc. Somiolog. 36. 1814.

Cerastium longepedunculatum Muhl. Cat. Pl. 46. 1813, nomen nudum.

Plains, mountain sides, and canyons, upward to the spruce belt. Nova Scotia to North Carolina, westward to British Columbia, Oregon, and Arizona.

5. Cerastum beeringianum Schlecht. & Cham. Linnaea **1**: 62. 1826.

Cerastium buffumae A. Nels. Bull. Torrey Club **26**: 239. 1899.

Cerastium variabile Goodding, Bot. Gaz. **37**: 54. 1904.

Spruce and alpine belts. Quebec to Alaska, southward to New Mexico and Arizona.

6. Cerastium strictum L. Sp. Pl. 439. 1753.

Plains and mountain sides, upward to the spruce belt. South Dakota to British Columbia, southward to Colorado and Utah; also in Europe and Asia.

3. SAGINA L. Pearlwort

1. Sagina saginoides (L.) Britton, Mem. Torrey Club **5**: 151. 1894.

Spergula saginoides L. Sp. Pl. 441. 1753.

Aspen, spruce, and alpine belts. Greenland to Alaska, southward to New Mexico and California; also in Europe and Asia.

4. ARENARIA L. Sandwort

Plant annual, 10 to 30 cm. high, puberulent. Leaves ovate, 3 or 5-ribbed, 4 to 7 mm. long; sepals acuminate, spinulose on the ribs; petals small. **1. A. serpyllifolia.**

Plants perennial.

Leaves ovate-lanceolate or oblong-lanceolate.

Plants 10 cm. high, puberulent, with spreading stems; leaves ovate-oblong, 5 to 10 mm. long; sepals 3 to 4 mm. long; petals obovate, entire, 5 mm. long_____**2. A. polycaulos.**

Plants 20 to 40 cm. high, puberulent; leaves oblong-lanceolate, 1 to 2 cm. long; sepals 3 mm. long; petals smaller_____**3. A. confusa.**

Leaves narowly linear to linear-oblong.

Inflorescence of headlike clusters or of small glomerules at the ends of branchlets. Plants 10 to 30 cm. high, woody at base, glabrous.

Flowers in heads about 1 cm. broad; sepals carinate, scarious, 4 mm. long; petals oblong, 8 mm. long; leaves 1 to 6 cm. long. **4. A. congesta.**

Flowers subsessile in glomerules at the ends of branchlets; leaves 1 to 3 cm. long; sepals scarious, 4 mm. long; petals slightly longer. **5. A. burkei.**

Infloresence open, not of headlike clusters.

Sepals obtuse, ovate to oblong, 4 to 5 mm. long.

Plants 2 to 5 cm. high, densely cespitose, glandular-pubescent; flowers solitary or few; petals spatulate, 6 to 7 mm. long; leaves subulate, 6 mm. long or less ---- **16. A. sajanensis.**

Plants 10 to 30 cm. high, not densely cespitose, glandular-pubescent; inflorescence open; petals 6 to 9 mm. long; leaves 2 to 7 cm. long, filiform ---- **6. A. formosa.**

Sepals acute or acuminate.

Plants glabrous.

Leaves 2 to 4 cm. long; petals 6 to 7 mm. long, exceeding the sepals; plants 20 to 30 cm. high, more or less shrubby. **11. A. macradenia.**

Leaves 1 to 2 cm. long; petals 6 mm. long, equaling the sepals; plants 10 to 20 cm. high, woody at base ---- **13. A. eastwoodiae.**

Plants more or less glandular-pubescent.

Plants 2 to 10 cm. high, more or less densely matted. Leaves 3 to 10 mm. long.

Leaves blunt, flat, 3-ribbed. Sepals 3 mm. long, exceeded by the petals ---- **15. A. propinqua.**

Leaves sharp-pointed, subulate, arcuate-spreading. Sepals lanceolate, long-acuminate.

Petals shorter than the sepals; valves of capsule entire. **14. A. nuttallii.**

Petals exceeding the sepals; valves of capsule 2-cleft. **9. A. compacta.**

Plants 10 to 20 cm. high, not densely matted.

Petals barely equaling the (4 to 5 mm. long) sepals. Sepals and pedicels densely glandular; lower leaves 5 to 10 cm. long. **12. A. fendleri.**

Petals exceeding the sepals.

Petals deeply bifid. Capsule half longer than the sepals; leaves 1 to 3 cm. long ---- **7. A. kingii.**

Petals not deeply cleft.

Capsule barely equaling the sepals; plants obscurely glandular ---- **8. A. uintahensis.**

Capsule exceeding the sepals; plants more or less densely glandular ---- **10. A. aculeata.**

1. Arenaria serpyllifolia L. Sp. Pl. 423. 1753.

About settlements; Idaho. Introduced from Europe. Quebec to Florida, westward to Oregon; also in the West Indies.

2. Arenaria polycaulos Rydb. Bull. Torrey Club **31**: 406. 1904.

Mountain sides and canyons of the yellow pine, aspen, and spruce belts; Colorado Plateau. Colorado, New Mexico, and Arizona.

3. Arenaria confusa Rydb. Bull. Torrey Club **28**: 275. 1901.

Aspen and spruce belts. Colorado, southwestern Utah, New Mexico, and Arizona.

4. Arenaria congesta Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 178. 1838.

Aspen and spruce belts. Montana to Colorado, westward to Washington and California.

5. Arenaria burkei Howell, Fl. Northw. Amer. 85. 1897.

Arenaria fendleri subcongesta S. Wats. in King, Geol. Expl. 40th Par. **5**: 40. 1871.

Aspen and spruce belts. Montana to Colorado, westward to Washington and California.

6. Arenaria formosa Fisch.; DC. Prodr. **1**: 402. 1824.

Dry hillsides and canyons of the yellow pine, aspen, and spruce belts. Alberta to British Columbia, southward to Utah and California; also in Asia.

7. Arenaria kingii (S. Wats.) Jones, Proc. Calif. Acad. II. **5**: 627. 1895.

Stellaria kingii S. Wats. in King, Geol. Expl. 40th Par. **5**: 39. *pl. 6, f. 1–3.* 1871.

Aspen and spruce belts. Utah and Nevada.

8. Arenaria uintahensis A. Nels. Bull. Torrey Club **26**: 7. 1899.

Rocky canyons of the artemisia, pinyon, and yellow pine belts. Wyoming to Oregon and California.

9. Arenaria compacta Coville, Proc. Biol. Soc. Washington **7**: 67. 1892.

Aspen and spruce belts. Utah to California.

10. Arenaria aculeata S. Wats. in King, Geol. Expl. 40th Par. **5**: 40. 1871.

Pinyon belt, upward to 3,000 meters. Idaho and Oregon, southward to Nevada and Arizona.

11. Arenaria macradenia S. Wats. Proc. Amer. Acad. **17**: 367. 1882.

Desert areas and mountain sides of the Covillea, artemisia, and pinyon belts. Southern Utah and Arizona to California.

12. Arenaria fendleri A. Gray, Mem. Amer. Acad. n. ser. **4**: 13. 1849.

Aspen, spruce, and alpine belts. Wyoming to New Mexico and Arizona.

13. Arenaria eastwoodiae Rydb. Bull. Torrey Club **31**: 406. 1904.

Artemisia, pinyon, and yellow pine belt. Colorado, Utah, and New Mexico.

14. Arenaria nuttallii Pax, Bot. Jahrb. Engler. **18**: 30. 1893.

Arenaria pungens Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 179. 1838. Not *A. pungens* Clem. 1816.

Yellow pine, aspen, spruce, and subalpine belts. Utah to California.

15. Arenaria propinqua Richards. Bot. App. Frankl. Journ. ed 2. 17. 1823.

Aspen, spruce, and alpine belts. Hudson Bay to British Columbia and Colorado.

16. Arenaria sajanensis Willd.; Schlecht. Ges. Naturf. Freund. Berlin Mag. **7**: 200. 1813.

Alsinopsis obtusiloba Rydb. Bull. Torrey Club **33**: 140. 1906.

Spruce and alpine belts. Alaska to Greenland, Colorado, and Arizona; also in Siberia.

5. MOEHRINGIA L.

Petals exceeding the obtuse sepals; leaves oval to elliptic-oblong, commonly obtuse, 1 to 2 cm. long, the margin rough; stems terete, 10 to 20 cm. high. **1. M. lateriflora.**

Petals equaling or shorter than the acute sepals; leaves lanceolate, acute, 1 to 2 cm. long; stems angled, 10 to 15 cm. high, puberulent. **2. M. macrophylla.**

1. Moehringia lateriflora (L.) Fenzl, Versuch Alsin. 18. 1833.
Arenaria lateriflora L. Sp. Pl. 423. 1753.
Wet and shaded places of the yellow pine, aspen, and spruce belts. Labrador to Alaska, southward to New Jersey, New Mexico, and Oregon; also in northern Asia.

2. Moehringia macrophylla (Hook.) Torr. in Wilkes, U. S. Expl. Exped. **17:** 246. 1874.
Arenaria macrophylla Hook. Fl. Bor. Amer. **1:** 102. *pl.* 37. 1830.
Wet and shaded places of the spruce and subalpine belts; southern Oregon and Idaho. Labrador to British Columbia, southward to Vermont, New Mexico, and California.

6. SPERGULA L. Spurry

1. Spergula arvensis L. Sp. Pl. 440. 1753.
About settlements in states adjacent to the Great Basin; introduced from Europe. Nova Scotia to Florida, California, and Alaska.

7. TISSA Adans. Sandspurry

Stipules lanceolate; sepals oblong-lanceolate, scarious-margined, slightly exceeding the petals; stems glabrous or nearly so ---------- **1. T. rubra.**
Stipules broadly triangular, as broad as long or broader; sepals 4 to 5 mm. long, ovate, obtuse or acutish; petals shorter than the sepals; plants glandular-pubescent ---------- **2. T. salina.**

1. Tissa rubra (L.) Britton, Bull. Torrey Club **16:** 127. 1889.
Arenaria rubra L. Sp. Pl. 423. 1753.
About settlements in states adjacent to the Great Basin; introduced from Europe. Newfoundland to Virginia, California, and British Columbia.

2. Tissa salina (Presl) Britton, Bull. Torrey Club **16:** 127. 1889.
Spergularia salina Presl, Fl. Cech. 95. 1819.
Tissa sparsiflora Greene, Erythea **3:** 47. 1895.
Saline soil of the artemisia belt. New Brunswick to Alaska, southward to Florida and California.

8. AGROSTEMMA L.

1. Agrostemma githago L. Sp. Pl. 435. 1753. Corncockle.
Fields and waste places; Idaho; introduced from Europe. Newfoundland to British Columbia, southward to Florida and California.

9. SILENE L. Campion. Catchfly

Plant 2 to 5 cm. high, densely cespitose, hirsute. Leaves spatulate, obtuse, mucronate, ciliate, 5 to 10 mm. long; flowers polygamo-dioecious, on pedicels 4 to 12 mm. long; calyx oblong-campanulate, 5 mm. long or more; petals purplish, retuse ---------- **4. S. acaulis.**
Plants 10 cm. high or more, cespitose or with simple stems.
Calyx 15 to 20-ribbed, inflated. Petals white or pink, 2-cleft; glabrous perennial, 20 to 40 cm. high; leaves oblong-lanceolate, 3 to 5 cm. long. **1. S. latifolia.**
Calyx mostly 10-ribbed.
Inflorescence leafy, the subtending leaves oblanceolate or oblong-lanceolate, 3 to 8 cm. long, acute at both ends. Calyx turbinate-ovoid, 5 mm. long or more; petals 2-cleft, white; plant 10 to 30 cm. high, retrorsely glandular-pubescent ---------- **6. S. menziesii.**

Inflorescence thyrsoid-paniculate, cymose, or spicate. Flowers subtended by bracts.
Petals 4 to many-parted or cleft.
Petals white or rose-colored; capsule stipitate.
Leaves oblanceolate, narrowed below into long petioles, the upper leaves lanceolate to linear-lanceolate; calyx oblong-cylindric, 15 mm. long. Petals white, auricled; plants 30 to 50 cm. high. **7. S. oregana.**
Leaves linear-oblanceolate, acuminate, the upper narrower; calyx cylindric, 14 to 18 mm. long.
Leaves 3 to 8 cm. long; plants 30 cm. high or less__**8. S. montana.**
Leaves 2.5 cm. long; plants 15 cm. high or less.
8a. S. montana rigidula.
Petals scarlet or deep purple; calyx subcylindric, 12 to 20 mm. long.
Leaves narrowly lanceolate to narrowly linear; flowers scarlet, usually 2 cm. broad or more; segments of petals linear; plants finely pubescent, 30 to 50 cm. high_____**5. S. laciniata.**
Leaves oblanceolate, 5 to 10 cm. long; flowers not over 16 mm. broad, deep purple; segments of petals oblong-linear; plants viscid-glandular, 60 cm. high or less_____**9. S. occidentalis.**
Petals 2-fid or 2-cleft.
Plants annual, 30 cm. high or more.
Plants glabrous or puberulent; stems slender; leaves oblanceolate to linear; calyx fusiform, 8 to 10 mm. long; petals obovate, appendaged, white or pink_____**3. S. antirrhina.**
Plants viscid-pubescent or hirsute; stems stout; leaves obovate to oblanceolate or linear-lanceolate, 1 cm. long or less; calyx inflated (in fruit), 20 to 30 mm. long; petals white or pinkish, exceeding the calyx_____**2. S. noctiflora.**
Plants perennial.
Leaves oblanceolate to lanceolate, the lowest at least 1 cm. broad, 10 cm. long or more. Calyx clavate-oblong, 12 mm. long or more; petals white or purplish, 15 to 20 mm. long; plant puberulent, 30 to 70 cm. high_____**14. S. scouleri.**
Leaves various, lanceolate to linear or oblanceolate, commonly less than 7 mm. broad.
Stems many, cespitose from a multicipital caudex. Leaves linear to narrowly oblanceolate; flowers few; calyx ovate, 10 to 12 mm. long, purple-ribbed; petals white or rose-colored.
10. S. watsoni.
Stems few.
Calyx 8 to 10 mm. long, purple-tinged, the lobes short, ovate; petals 15 mm. long or less, brownish purple to white; plants puberulent, 10 to 30 cm. high, with linear-oblanceolate to linear leaves_____**12. S. lyallii.**
Calyx 12 to 18 mm. long, somewhat inflated, the lobes obtuse, often constricted at base; leaves linear or linear-oblanceolate; stems 30 to 50 cm. high, geniculate below.
Stems finely puberulent throughout; calyx 12 to 14 mm. long; petals pink or white, 20 mm. long or less, with broad obtuse lobes_____**11. S. douglasii.**
Stems puberulent or nearly smooth; calyx 16 to 20 mm. long; petals pink or purplish, lobes obtuse__**13. S. macrocalyx.**

1. Silene latifolia (Mill.) Britten & Rendle, List Brit. Seed Plants & Ferns 5. 1907.
Cucubalus latifolius Mill. Gard. Dict. ed. 8. *Cucubalus* no. 2. 1768.
In cultivation; escaped northward and in California. Native of Europe.

2. Silene noctiflora L. Sp. Pl. 419. 1753.
Gardens and waste places; introduced from Europe. Nova Scotia to Florida, Utah, and Washington.

3. Silene antirrhina L. Sp. Pl. 419. 1753.
Fields, waste places, and foothills of the artemisia, pinyon, and yellow pine belts. Newfoundland to British Columbia, southward to Florida and California.

4. Silene acaulis L. Sp. Pl. ed. 2. 603. 1762. MOSS CAMPION.
Among rocks in the spruce and alpine belts. Arctic America to New Hampshire and Arizona; also in Europe and Asia.

5. Silene laciniata Cav. Icon. Pl. **6**: 44. *pl. 564*. 1801. MEXICAN CAMPION.
Canyons and mountain sides of the yellow pine, aspen, and spruce belts. California to western Texas and Mexico.

6. Silene menziesii Hook. Fl. Bor. Amer. **1**: 90. *pl. 30*. 1830.
Silene dorrii Kellogg, Proc. Calif. Acad. **3**: 44. *f. 12*. 1863.
Aspen and spruce belts. Saskatchewan to Missouri, westward to California.

7. Silene oregana S. Wats. Proc. Amer. Acad. **10**: 343. 1875.
Canyons and mountain sides of the yellow pine, aspen, and spruce belts; Idaho. Washington to California, Nevada, and Montana.

8. Silene montana S. Wats. Proc. Amer. Acad. **10**: 343. 1875.
Silene shockleyi S. Wats. Proc. Amer. Acad. **25**: 127. 1890.
Canyons and mountain sides of the artemisia, yellow pine, and aspen belts. Nevada and California.

8a. Silene montana rigidula Robinson, Proc. Amer. Acad. **28**: 140. 1893.
Franktown, Nevada.

9. Silene occidentalis S. Wats. Proc. Amer. Acad. **10**: 343. 1875.
Foothills and canyons of the artemisia, yellow pine, and aspen belts. California and western Nevada.

10. Silene watsoni Robinson, Proc. Amer. Acad. **28**: 143. 1893.
Spruce belt. California and Nevada.

11. Silene douglasii Hook. Fl. Bor. Amer. **1**: 88. 1830.
Aspen and spruce belts. Montana to Utah, westward to British Columbia and California.

12. Silene lyallii S. Wats. Proc. Amer. Acad. **10**: 342. 1875.
Silene tetonensis E. Nels. Bot. Gaz. **30**: 117. 1900.
Spruce and alpine belts. Montana to Utah (?), westward to Oregon.

13. Silene macrocalyx (Robinson) Howell, Fl. Northw. Amer. 78. 1897.
Silene douglasii macrocalyx Robinson, Proc. Amer. Acad. **28**: 145. 1893.
Canyons and mountain sides of the yellow pine, aspen, and spruce belts. Nevada, Oregon, and California.

14. Silene scouleri Hook. Fl. Bor. Amer. **1**: 88. 1830.
Aspen and spruce belts. Montana to Colorado, Oregon, and British Columbia.

10. LYCHNIS L. Campion

Plants 10 to 20 cm. high, puberulent and glandular-viscid. Leaves narrowly linear to linear-lanceolate; calyx more or less inflated, ellipsoidal, 12 mm. long or more, the lobes broadly ovate.
Flowers nodding in anthesis; petals included, bifid, the lobes irregular.
1. L. apetala.
Flowers erect in anthesis; petals exserted, the claws of the petals and filaments ciliate---2. L. kingii.
Plants 30 cm. high or more, more or less viscid-glandular or puberulent. Petals white or purplish.
Petals included; calyx 10 to 12 mm. long, cylindric-oblong; leaves oblanceolate to linear---3. L. drummondii.
Petals exserted; calyx 10 mm. long or more; leaves linear-lanceolate, 15 cm. long or less. Plants 30 to 50 cm. high.
Petals bifid; calyx oblong---4. L. striata.
Petals 4-lobed; calyx obovate---5. L. nuda.

1. Lychnis apetala L. Sp. Pl. 437. 1753.

Alpine belts; Uintah Mountains, Utah. Greenland to Alaska, southward to Colorado and northern Utah; also in Europe and Asia.

2. Lychnis kingii S. Wats. Proc. Amer. Acad. **12**: 247. 1877.

Alpine belts, Utah.

3. Lychnis drummondii (Hook.) S. Wats. in King, Geol. Expl. 40th Par. **5**: 37. 1871.

Silene drummondii Hook. Fl. Bor. Amer. **1**: 89. 1830.

Yellow pine, aspen, and spruce belts. Manitoba to British Columbia, southward to New Mexico and Arizona.

4. Lychnis striata Rydb. Bull. Torrey Club **31**: 408. 1904.

Spruce and subalpine belts. Alberta to Colorado and Utah.

5. Lychnis nuda S. Wats. in King, Geol. Expl. 40th Par. **5**: 37. 1871.

Lychnis pectinata subnuda Robinson in A. Gray, Syn. Fl. **1**[1]: 220. 1897.

Aspen and spruce belts, Nevada. Possibly only an aberrant form of *L. pectinata*.

11. VACCARIA Medic.

1. Vaccaria vulgaris Host, Fl. Austr. **1**: 518. 1827. Cow soapwort.

Saponaria vaccaria L. Sp. Pl. 409. 1753.

Waste places; introduced from Europe. Ontario to Alaska, southward to Florida and California.

12. SAPONARIA L. Soapwort

1. Saponaria officinalis L. Sp. Pl. 408. 1753. Bouncing-bet.

Roadsides and about settlements; Colorado and Idaho. Introduced from and Europe and established almost throughout North America.

43. NYMPHAEACEAE. Waterlily Family

Aquatic herbs with thick rhizomes; leaves simple, cordate or peltate, floating; flowers perfect, terminating long scapes; sepals 3 to 6; petals numerous; stamens numerous; staminodia present; carpels many, forming a compound ovary; stigmas united, forming a disc; ovules numerous; fruit fleshy or spongy, indehiscent, many-seeded.

1. NYMPHAEA L. Spatterdock

1. Nymphaea polysepala (Engelm.) Greene, Bull. Torrey Club **15**: 84. 1888. Wokas.

Nuphar polysepala Engelm. Trans. Acad. St. Louis. **2**: 282. 1865.

Ponds and lakes of the pinyon belt, upward to the subalpine belt. Colorado to California and Alaska.

44. CERATOPHYLLACEAE. Hornwort Family

Submerged aquatics with slender branching stems; leaves verticillate, dichotomously forked, the divisions spinulose-serrate; flowers monoecious or dioecious, solitary, axillary, enclosed in a membranous many-parted perianth, the staminate flowers with numerous stamens; anthers nearly sessile; pistillate flowers with a single sessile 1-celled ovary; style long, persistent; fruit an achene.

1. CERATOPHYLLUM L. Hornwort

1. Ceratophyllum demersum L. Sp. Pl. 992. 1753.

In ponds and lakes. Throughout temperate North America, and in Europe.

45. RANUNCULACEAE. Buttercup Family

Annual or perennial herbs with acrid juice; pubescence of simple hairs or none; leaves mostly alternate (opposite in *Clematis*), simple or compound, estipulate; flowers polypetalous or with petals wanting and calyx petaloid; sepals 3 to 15, usually caducous; petals 2 to 15 or none; stamens numerous, hypogynous; carpels many, 1-celled, 1 to many-ovuled; fruit of achenes, follicles, or berries.

Leaves opposite, pinnate or two or three times ternately compound, the upper often simple. Sepals petaloid; petals none; styles long, plumose or pubescent, persistent on the achene ..... **10. CLEMATIS.**

Leaves alternate or basal.

Flowers irregular. Leaves mostly palmately lobed or divided, the segments entire or toothed.

Posterior sepal spurred; petals small, the 2 posterior ones prolonged into spurlike appendages enclosed in the spurred sepal .. **6. DELPHINIUM.**

Posterior sepal hood-shaped; petals small, the two upper long-clawed and concealed under the hood, the others small or wanting. **7. ACONITUM.**

Flowers regular. Petals present or wanting.

Petals produced into basal spurs. Leaves ternately compound. **5. AQUILEGIA.**

Petals not spurred, often wanting.

Sepals spurred. Leaves basal, linear or filiform; scapes 1-flowered, 10 cm. high or less; pistils numerous, borne on a cylindric receptacle. **11. MYOSURUS.**

Sepals not spurred.

Petals present.

Plants scapose, 5 to 30 cm. high.

Leaves simple; petals yellow ..... **13. RANUNCULUS.**

Leaves ternately dissected; petals rose-colored, 10 to 15 mm. long. Achenes thin-walled, scarious-margined, apiculate. **14. BECKWITHIA.**

Plants with leafy stems.
Leaves ternately compound. Plants robust.
Flowers large, purple, white, or red; sepals and petals mostly 5; ovaries 2 to 5, many-ovuled, the style short; fruit of 2 to 5 oblong several-seeded follicles; perennial glabrous fleshy herb; leaf segments oblong or oblanceolate. **1. PAEONIA.**
Flowers small, white, in terminal racemes, the sepals caducous, petaloid; carpels many-ovuled, stigma sessile, broad; fruit baccate; coarse perennial; leaflets ovate, incised or toothed. **4. ACTAEA.**
Leaves not ternately compound.
Leaves (at least the lower) dissected into capillary segments.
Flowers white, solitary, on peduncles opposite the leaves; fruit of transversely wrinkled achenes; aquatics. **15. BATRACHIUM.**
Leaves varying from simple to palmately or pinnately dissected, the segments not capillary.
Fruit of 5 or more follicles. Perennial, 30 cm. high, nearly glabrous; leaves palmately lobed or divided, the segments cuneate, toothed; sepals petaloid, 1 cm. long; petals small, white. **3. TROLLIUS.**
Fruit a head of achenes. Sepals green; petals yellow. **13. RANUNCULUS.**
Petals wanting.
Leaves twice or thrice ternately compound. Flowers small, greenish white, perfect, dioecious, or polygamous, paniculate; fruit of stipitate or sessile, ribbed or nerved achenes. **16. THALICTRUM.**
Leaves not twice or thrice ternately compound (except in species of *Anemone*.)
Flowers small, whitish, corymbosely paniculate. Achenes capitate, angled, inflated; perennial, 1 meter high or less, with large, palmately lobed, irregularly serrate leaves, **12. TRAUTVETTERIA.**
Flowers large, not corymbosely paniculate.
Sepals bluish purple, 3 cm. long or more. Styles plumose, persistent on the achenes; villous-hirsute perennial with long-petioled dissected leaves; involucre distant, similar to the leaves. **9. PULSATILLA.**
Sepals yellow, white, or pink, dark purple in one species, 2 cm. long or less.
Leaves simple, basal or nearly so (in our species); flowers white; fruiting follicles 10 to 15 mm. long. **2. CALTHA.**
Leaves more or less ternately or palmately dissected; flowers white or pink; fruit of achenes. **8. ANEMONE.**

1. PAEONIA L. Peony

1. Paeonia brownii Dougl.; Hook. Fl. Bor. Amer. 1: 27. 1829.

Open grassy slopes, at 1,500 to 2,700 meters; Humboldt Mountains, Nevada, and westward. Alberta to British Columbia, southward to California and Utah (?).

2. CALTHA L. Marshmarigold

Leaves longer than broad, oval-cordate to round-obovate_____1. C. leptosepala.
Leaves broader than long, round-reniform, the basal lobes overlapping.
2. C. biflora.

1. **Caltha leptosepala** DC. Reg. Veg. Syst. 1: 310. 1818.
Caltha rotundifolia Greene, Pittonia 4: 80. 1899.
Caltha chionophila Greene, Pittonia 4: 80. 1899.
Wet places in the spruce belt. Alberta to British Columbia and New Mexico.

2. **Caltha biflora** DC. Reg. Veg. Syst. 1: 310. 1818.
Caltha howellii Greene, Pittonia 4: 79. 1899.
Cold bogs and rivulets of high mountains. Alaska to California and western Nevada.

3. TROLLIUS L. Globeflower

1. **Trollius albiflorus** (A. Gray) Rydb. Mem. N. Y. Bot. Gard. 1: 152. 1900.
Trollius laxus albiflorus A. Gray, Amer. Journ. Sci. II. 33: 241. 1862.
Spruce and subalpine belts; Uintah Mountains, Utah. Alberta and British Columbia, southward to Colorado and Washington.

4. ACTAEA L. Baneberry

1. **Actaea arguta** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 35. 1838.
Actaea eburnea Rydb. Mem. N. Y. Bot. Gard. 1: 153. 1900.
Pinyon belt, upward to 3,000 meters. Alaska to California, New Mexico, and South Dakota.

5. AQUILEGIA L. Columbine

Flowers red or pink, with more or less yellow or green.
Plants 30 cm. high or less; leaflets small. Flowers 2 cm. long, pendulous in anthesis; sepals greenish, 1 cm. long; yellow laminae of the petals half as long as the saccate curved spurs; ovaries pubescent____6. A. elegantula.
Plants taller; leaflets medium or large.
Spurs decidedly longer than the sepals. Flowers pendulous in anthesis.
Sepals (pink) 1 cm. long; spurs 2 cm. long, tapering uniformly.
7. A. rubicunda.
Sepals 1.5 cm. long or more; spurs 2.5 cm. long or more__4. A. shockleyi.
Spurs and sepals subequal. Flowers pendulous in anthesis; follicles 2 cm. long or more.
Lamina of petals obsolete or very short_____2. A. truncata.
Lamina yellow, truncate or rounded, 5 mm. long or more.
Leaves biternate _____3. A. formosa.
Leaves triternate.
Leaflets prevailingly broad-cuneate_____3. A. formosa dissecta.
Leaflets mostly with a rounded or cordate base.
3b. A. formosa caelifax.
Flowers yellow, blue, bluish purple, white or varying to white, never red.
Flowers wholly yellow (sometimes tinged with pink). Spurs slightly curved.
Stems densely glandular-pubescent, 30 to 50 cm. high; leaflets broadly cuneate. Sepals oval, 1 cm. long, the lamina 7 to 8 mm. long, the spurs twice longer; follicles glandular_____8. A. micrantha.
Stems glabrous or nearly so below, 20 to 70 cm. high; leaflets broadly cuneate or with rounded base, 2 cm. long or more.
Spur about 2 cm. long; sepals lanceolate, somewhat shorter; follicles 2 cm. long, pubescent_____5. A. flavescens.

Spur about 4 cm. long; sepals lanceolate, 2 cm. long or more; follicles 2 cm. long or more, sparingly pubescent_____14. **A. thalictrifolia.**

Flowers blue or bluish purple, varying to pure white, erect in anthesis.

Spurs shorter than the (8 mm. long) obtuse yellowish laminae. Petals and spurs light blue; follicles 1 cm. long, glabrous_1. **A. saximontana.**

Spurs exceeding the laminae.

Spur 6 cm. long or more, slender. Flowers mostly white; ovaries pubescent; leaflets with cuneate or rounded base, 1 cm. long or more. **10. A. pinetorum.**

Spur 5 cm. long or less.

Stems and petioles glandular and pubescent. Leaflets cuneate to suborbicular; sepals 15 mm. long, lanceolate, white or pale blue; petals white; follicles pubescent_____13. **A. pallens.**

Stems (at least below) glabrous.

Stems few from a stout root, 40 to 80 cm. high; leaves mostly biternate; sepals ovate-oblong, acute or obtuse.

Sepals white_____9a. **A. caerulea albiflora.**

Sepals blue.

Petals white; spur 3 to 5 cm. long_____9. **A. caerulea.**

Petals yellow; spur 2 to 3 cm. long_____12. **A. oreophila.**

Stems numerous from a multicipital root, 10 to 20 cm. high; leaflets crowded, 1 cm. long or less; sepals bluish purple; petals white. Ovaries pubescent_____11. **A. scopulorum.**

1. Aquilegia saximontana Rydb.; Robinson in A. Gray, Syn. Fl. 1: 43. 1895.

Spruce and alpine belts among rocks; Uintah Mountains, Utah. Colorado and eastern Utah.

2. Aquilegia truncata Fisch. & Mey. Ind. Sem. Hort. Petrop. 9: Suppl. 8. 1843.

Aspen and spruce belts; southern Nevada. Nevada and California.

3. Aquilegia formosa Fisch.; DC. Prodr. 1: 50. 1824. SITKA COLUMBINE.

Shaded places in the pinyon belt, upward to 3,000 meters. Utah to California, northward to Montana and Alaska.

3a. Aquilegia formosa dissecta Payson, Contr. U. S. Nat. Herb. **20: 144. 1918.**

Meadow Valley Wash, Nevada.

3b. Aquilegia formosa caelifax Payson, Contr. U. S. Nat. Herb. **20: 144.** *pl. 9.* 1918.

Canyons of the artemisia belt. Nevada.

4. Aquilegia shockleyi Eastw. Bull. Torrey Club **32: 193. 1905.**

Soda Spring Canyon, Esmeralda County, western Nevada.

5. Aquilegia flavescens S. Wats. in King, Geol. Expl. 40th Par. **5: 10. 1871.**

Aquilegia depauperata Jones, Contr. West. Bot. **8: 1. 1898.**

Aspen and spruce belts. Alberta and British Columbia, southward to Utah and Oregon.

Aquilegia flavescens f. *minor* Tidestrom (Amer. Midl. Nat. **1: 171. 1910**) is a more hairy and smaller, subalpine plant.

6. Aquilegia elegantula Greene, Pittonia **4: 14. 1899.**

Spruce and subalpine belts; eastern Utah. Southern Colorado, New Mexico, and adjacent Utah.

7. Aquilegia rubicunda Tidestrom, Amer. Midl. Nat. **1: 168. 1910.**

Rocky canyons, in the pinyon and yellow pine belts; central and southern Utah. Utah, New Mexico, and Arizona.

8 Aquilegia micrantha Eastw. Proc. Calif. Acad. II. 4: 559. *pl. 19.* 1895.

Canyons of the pinyon belt; southern Utah. Southwestern Colorado, Utah, and Arizona.

9. Aquilegia caerulea James in Long, Exped. 2: 15. 1823.

COLORADO COLUMBINE.

Aspen belt, upward to 3,300 meters; rare in Utah; Mt. Terrell. Montana, New Mexico, and Utah.

This species is the State flower of Colorado.

9a. Aquilegia caerulea albiflora A. Gray; Robinson in A. Gray, Syn. Fl. 1: 44. 1895.

Aquilegia leptocera Nutt. Journ. Acad. Phila. 7: 9. 1834.

Aspen and spruce belts; the common form throughout the mountains. This form grows with *A. caerulea* on Mt. Terrell. Wyoming and Colorado, westward to Idaho and Nevada.

10. Aquilegia pinetorum Tidestrom, Amer. Midl. Nat. 1: 166. 1910.

Aspen, yellow pine, and spruce belts; yellow pine area, Buckskin Mountains (Kaibab Plateau), northern Arizona. Southern Utah, Colorado, and Arizona.

11. Aquilegia scopulorum Tidestrom, Amer. Midl. Nat. 1: 167. 1910.

Spruce and alpine belts; on gravelly slopes, Wasatch Peak, central Utah.

Aquilegia scopulorum f. *calcarea* (Jones) Tidestrom, (Amer. Midl. Nat. 1: 167. 1910) is a glandular-hairy form occurring on yellow pine areas of southern Utah, altitude 2,100 meters.

12. Aquilegia oreophila Rydb. Bull. Torrey Club 29: 146. 1902.

Subalpine and alpine belts; Uintah Mountains, Utah. Wyoming and Utah.

13. Aquilegia pallens Payson, Bot. Gaz. 60: 375. 1915.

Cliffs of the pinyon belt. Western Colorado and eastern Utah.

14. Aquilegia thalictrifolia Rydb. Bull. Torrey Club 29: 145. 1902

Aspen and spruce belts. Texas to southern Utah and Arizona.

6. DELPHINIUM L. LARKSPUR

Ovary and follicle solitary, 12 to 20 mm. long, puberulent. Flowers blue or purple; leaves dissected into linear lobes; introduced annual__1. **D. ajacis.**

Ovaries and follicles 3 to 5.

Plants 1 meter high or more, with deep roots. Stems leafy.

Pubescence tawny, viscid, spreading. Flowers dark blue, occasionally pink or cream-colored; ovaries and follicles glabrous; leaf blades 7 to 15 cm. broad.

Sepals equaling the spur or shorter, lanceolate_____6. **D. barbeyi.**

Sepals much exceeding the spur, linear-lanceolate, attenuate.

7. **D. attenuatum.**

Pubescence not tawny, close or none.

Stems glabrous or nearly so; flowers dark blue. Ovaries and follicles glabrous_____2. **D. glaucum.**

Stems (at least the upper part) beset with a close white pubescence; flowers blue.

Leaf segments linear. Follicles puberulent_____5. **D. stachydeum.**

Leaf segments lanceolate or broader.

Ovaries and follicles sparingly viscid-puberulent, 3. **D. occidentale.**

Ovaries and follicles densely pubescent_____4. **D. cucullatum.**

Plants 60 cm. high or less. Flowers blue.
Stems scapose or nearly so (occasionally with 1 or 2 reduced stem leaves), glabrous. Leaf blades reniform, 3-cleft, with rounded lobes; follicles glabrous or nearly so; roots woody_____9. D. scaposum.
Stems leafy, the upper leaves often much reduced.
Sepals light blue, oblong, obtuse, 1 cm long. Follicles nearly straight, slightly puberulent; stems 50 cm. high, glabrous or slightly puberulent; ultimate leaf segments linear to oblong____8. D. amabile.
Sepals dark blue.
Roots woody, elongate.
Plants grayish, strigose throughout. Plant leafy toward the base, the ultimate leaf segments linear, 1 to 4 cm. long; follicles canescent_____11. D. geyeri.
Plants glabrous or nearly so or pubescent above.
Sepals 15 to 18 mm. long, ovate-lanceolate; ovaries and follicles more or less viscid-pubescent; leaf segments linear or linear-oblong_____12. D. bicolor.
Sepals 12 mm. long, barely surpassing the petals; ovary and follicles puberulent; leaf segments rounded. 10. D. andersonii.
Roots tuberous.
Inflorescence glabrous or nearly so. Primary leaf segments cleft, often 8 mm. broad; sepals elliptic, obtuse; follicles glabrous. 15. D. gracilentum.
Inflorescence pubescent, somewhat viscid.
Primary leaf segments commonly entire; sepals oblong, much exceeded by the slender straight spur; follicles appressed-pubescent_____14. D. depauperatum.
Primary leaf segments (at least below) variously lobed or cleft; sepals spatulate, oblong, surpassed by the slightly curved spur; follicles glabrous or pubescent_____13. D. menziesii.

1. Delphinium ajacis L. Sp. Pl. 531. 1753.
In cultivation and occasionally escaped; introduced from Europe.

2. Delphinium glaucum S. Wats. Bot. Calif. **2**: 427.1880.
Aspen and spruce belts; eastern slopes of Sierra Nevada. Oregon, California, and western Nevada.

3. Delphinium occidentale S. Wats. Bot. Calif. **2**: 428. 1880.
Aspen and spruce belts. Wyoming to Colorado, Utah, and Idaho.

4. Delphinium cucullatum A. Nels. Bull. Torrey Club **27**: 262. 1900.
Delphinium abietorum Tidestrom, Proc. Biol. Soc. Washington **27**: 61. 1914.
Spruce belt. Wyoming and Utah.

5. Delphinium stachydeum (A. Gray) Tidestrom, Proc. Biol. Soc. Washington **27**: 61. 1914.
Delphinium scopulorum stachydeum A. Gray, Bot. Gaz. **12**: 52. 1887.
Aspen and spruce belts. Washington to northern Nevada and Utah (?).

6. Delphinium barbeyi Huth, Bull. Herb. Boiss. **1**: 335. 1893.
Spruce and alpine belts. Wyoming, Colorado, and Utah.

7. Delphinium attenuatum (Jones) Rydb. Fl. Rocky Mount. 313. 1917.
Delphinium scopulorum attenuatum Jones, Proc. Calif. Acad. II. **5**: 617. 1895.
Spruce and subalpine belts. Utah.

8. Delphinium amabile Tidestrom.

Delphinium coelestinum Rydb. Bull. Torrey Club **39**: 320. 1912, not Franchet 1894.

Plains and dry hillsides. Southern Utah, Nevada, and Arizona.

9. Delphinium scaposum Greene, Bot. Gaz. **6**: 156. 1881.

Mesas and dry slopes of the Covillea, artemisia, and pinyon belts. Colorado, Utah, New Mexico, and Arizona.

10. Delphinium andersonii A. Gray, Bot. Gaz. **12**: 53. 1887.

Delphinium decorum nevadense S. Wats. Bot. Calif. **1**: 11. 1876.

Delphinium leonardi Rydb. Bull. Torrey Club **39**: 320. 1912.

Foothills and canyons of the pinyon, yellow pine, and aspen belts. Western Utah and Nevada.

11. Delphinium geyeri Greene, Erythea **2**: 189. 1894.

Plains. Wyoming, Colorado, and northeastern Utah(?).

12. Delphinium bicolor Nutt. Journ. Acad. Phila. **7**: 10. 1834.

Plains and foothills. Saskatchewan to Washington, southward to Utah and Oregon.

13. Delphinium menziesii DC. Reg. Veg. Syst. **1**: 355. 1818.

Delphinium nelsonii Greene, Pittonia **3**: 92. 1896.

Delphinium pinetorum Tidestrom, Proc. Biol. Soc. Washington **26**: 121. 1913.

Aspen, spruce, and subalpine belts. British Columbia and Idaho, southward to California and New Mexico.

Delphinium pinetorum appears to be only a form with very narrow leaf segments. It ranges chiefly in the yellow pine forests from Kaibab Plateau northward.

14. Delphinium depauperatum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 33. 1838.

Delphinium diversifolium Greene, Pittonia **3**: 93. 1898.

Aspen and spruce belts. Nevada.

15. Delphinium gracilentum Greene, Pittonia **3**: 15. 1896.

Delphinium sonnei Greene, Pittonia **3**: 246. 1897.

Aspen and spruce belts. Nevada and California.

7. ACONITUM L. Monkshood

Flowers ochroleucous. Hood saccate, the beak porrect; plants 40 to 80 cm. high, viscid-pubescent; leaf blades 10 cm. broad or less----**3. A. lutescens.**

Flowers blue or purple.

Plants perfectly glabrous. Leaf blades 5 to 10 cm. broad, the ultimate lobes acute or acuminate; hood deeply saccate, about 18 mm. long; beak porrect, nearly horizontal----**4. A. glaberrimum.**

Plants more or less pubescent or viscid (at least above).

Front line of hood nearly straight, the beak more or less prominent. Leaf segments rhombic-cuneate, the teeth or lobules lanceolate.

1. A. columbianum.

Front line of hood curved, the beak nearly horizontal.

Hood not deeply saccate, 15 mm. high or less; ultimate leaf lobes obtuse or acute----**6. A. helleri.**

Hood deeply saccate; ultimate leaf lobes acute or acuminate.

Hood 12 to 20 mm. long----**2. A. bakeri.**

Hood 25 mm. long or more----**5. A. subcaesium.**

1. **Aconitum columbianum** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 34. 1838.
Aconitum patens Rydb. Fl. Rocky Mount. 315, 1062. 1917.
Aspen, spruce, and alpine belts. British Columbia to Montana, southward to California and Colorado.

2. **Aconitum bakeri** Greene, Pl. Baker. 3: 5. 1901.
Aconitum atrocyaneum Rydb. Bull. Torrey Club 29: 150. 1902.
Aconitum porrectum Rydb. Bull. Torrey Club 29: 150. 1902.
Spruce belt. Wyoming, Colorado, and Utah.

3. **Aconitum lutescens** A. Nels. Bot. Gaz. 42: 51. 1906.
Spruce belt. Wyoming to New Mexico, Utah (?), and Idaho.

4. **Aconitum glaberrimum** Rydb. Bull. Torrey Club 29: 151. 1902.
Along streams. Southern Utah and northern Arizona.

5. **Aconitum subcaesium** Greene, Repert. Nov. Sp. Fedde 7: 4. 1909.
Springy places and shady ravines, at 1,850 to 2,500 meters or more. Nevada.

6. **Aconitum helleri** Greene, Repert. Nov. Sp. Fedde 7: 4. 1909.
Yellow pine and aspen belts; Sierra Nevada. California and western Nevada.

8. ANEMONE L. ANEMONE

Plants glabrate or sparingly villous, 10 to 30 cm. high.
- Plant with tuberous roots; leaves once or twice ternate, the divisions rhombic, ternately cleft or lobed; sepals linear-oblong, 10 mm. long or more, white or purplish; head of fruit cylindric; achenes densely woolly. **1. A. tuberosa.**
- Plant with rootstocks; leaves biternate, the segments oblong, acute; sepals oval, 6 to 10 mm. long, dark purple to white, tinged with blue outside; head of fruit globose; achenes strigose **4. A. tetonensis.**

Plants conspicuously silky-villous, 20 to 50 cm. high.
- Sepals oblong, greenish white; heads of fruit cylindric; achenes densely woolly; leaf segments rhombic-cuneate, incisely toothed or cleft. **2. A. cylindrica.**
- Sepals oval, ochroleucous, tinged with blue, pink, or purplish; heads of fruit globose; achenes densely villous; leaves thrice cleft into lanceolate or oblong lobes **3. A. globosa.**

1. **Anemone tuberosa** Rydb. Bull. Torrey Club 29: 151. 1902.
Covillea belt. Southern Utah and Nevada southward.

2. **Anemone cylindrica** A. Gray, Ann. Lyc. N. Y. 3: 221. 1836.
Hillsides and canyons of the yellow pine belt; western Colorado and northern Arizona. New Brunswick to British Columbia, southward to New Jersey and Arizona.

3. **Anemone globosa** Nutt.; Pritz. Linnaea 15: 673. 1841.
Anemone lithophila Rydb. Bull. Torrey Club 29: 152. 1902.
Spruce belt. Alaska to California and New Mexico.

4. **Anemone tetonensis** Porter in Britton, Ann. N. Y. Acad. 6: 224. 1891.
Anemone stylosa A. Nels. Bot. Gaz. 42: 52. 1906.
Spruce belt. Northern Utah to Montana and British Columbia.

9. PULSATILLA Adans.

1. **Pulsatilla ludoviciana** (Nutt.) Heller, Cat. N. Amer. Pl. ed. 2. 4. 1900.
AMERICAN PASQUEFLOWER.
Anemone ludoviciana Nutt. Gen. Amer. Pl. 2: 20. 1818.
Pulsatilla hirsutissima Britton, Ann. N. Y. Acad. 6: 217. 1891. Not *Clematis hirsutissima* Pursh, 1814.

Plains and slopes, at 1,200 to 3,000 meters; common in *Pinus murrayana* forests along the Continental Divide. Illinois to Texas, Utah, Washington, and Alaska.

10. CLEMATIS L. CLEMATIS

Plants erect. Sepals brownish purple, often over 3 cm. long. (VIORNA.)
Ultimate leaf segments narrowly linear, 1 to 3 mm. wide; plant permanently villous ---- **3. C. eriophora.**
Ultimate leaf segments broader, linear to linear-lanceolate; plant glabrate in age ---- **4. C. hirsutissima.**

Plants climbing.
Flowers paniculate, dioecious; sepals white, 1 cm. long or less. (CLEMATIS.)
Leaflets lanceolate to ovate-lanceolate, coarsely toothed to entire; sepals oblanceolate; styles 4 to 5 cm. long ---- 1. C. ligusticifolia.
Leaflets broadly ovate, rounded or cordate at base; sepals spatulate; styles 2 to 3 cm. long ---- **2. C. brevifolia.**
Flowers large, solitary, pedunculate, nodding; sepals purple or blue, lanceolate, 5 cm. long or less. (ATRAGENE.)
Leaves ternate; leaflets cordate-ovate, 2 to 4 cm. long; styles in fruit 4 to 5 cm. long ---- **5. C. columbiana.**
Leaves biternate; secondary leaflets lanceolate to ovate-lanceolate, 2 cm. long or more; styles in fruit 3 to 4 cm. long ---- **6. C. pseudoalpina.**

1. Clematis ligusticifolia Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 9. 1838.
WESTERN VIRGINS-BOWER.

Canyons and hillsides of the artemisia belt, upward to the aspen belt. North Dakota to British Columbia, southward to New Mexico and California.

2. Clematis brevifolia (Nutt.) Howell, Fl. Northw. Amer. 8. 1897.
Clematis ligusticifolia brevifolia Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 9. 1838.
Pinyon, yellow pine, and aspen belts. Montana to Utah (?), Oregon, and Washington. Perhaps only a form of the preceding species.

3. Clematis eriophora Rydb. Bull. Torrey Club **29**: 154. 1902.
Artemisia, pinyon, and yellow pine belts; Abajo Mountains; Utah. Wyoming to New Mexico and eastern Utah.

4. Clematis hirsutissima Pursh, Fl. Amer. Sept. 385. 1814.
DOUGLAS CLEMATIS.

Clematis douglasii Hook. Fl. Bor. Amer. **1**: 1. *pl. 1.* 1829.
Clematis douglasii jonesii Kuntze, Verh. Bot. Ver. Brand. **26**: 180. 1886.
Yellow pine, aspen, and spruce belts. Washington and Oregon to Utah and Colorado.

5. Clematis columbiana (Nutt.) Torr. & Gray, Fl. N. Amer. **1**: 11. 1838.
Atragene columbiana Nutt. Journ. Acad. Phila. **7**: 7. 1834.
Pinyon belt, upward to the spruce belt. Alberta and British Columbia to Utah and Colorado.

6. Clematis pseudoalpina (Kuntze) A. Nels.; Coulter, New Man. Rocky Mount 198. 1909.
Clematis pseudoatragene pseudoalpina Kuntze, Verh. Bot. Ver. Brand. **26**: 160. 1884.
Yellow pine, aspen, and spruce belts. Colorado, Utah, and New Mexico.

11. MYOSURUS L. Mousetail

Achenes aristate-beaked----------1. **M. aristatus.**
Achenes with short or obsolete beak----------2. **M. minimus.**

1. Myosurus aristatus Benth. Lond. Journ. Bot. **6**: 458. 1847.

Muddy places in the Great Basin, upward to 2,700 meters. Montana to Washington, southward to New Mexico and California.

2. Myosurus minimus L. Sp. Pl. 284. 1753.

Muddy places, with the preceding species. Ontario to Florida, westward to Washington and California; also in the Old World.

12. TRAUTVETTERIA Fisch. & Mey.

1. Trautvetteria grandis Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 37. 1839.

Trautvetteria media Greene, Leaflets **2**: 192. 1912.

Bogs and wet places of the spruce and subalpine belts. Montana to British Columbia, southward to New Mexico and California.

13. RANUNCULUS L. Buttercup

Achenes muricate. Lower leaves roundish or reniform, 3-lobed and crenate, the upper 3-cleft, the lobes wedge-shaped and toothed; petals exceeding the calyx; achenes long-beaked; introduced annual------**20. R. arvensis.**
Achenes smooth, glabrous or puberulent.
  Leaves all or partly with an entire margin.
    Leaves partly with an entire margin, the basal spatulate to roundish, entire or crenate, the cauline entire or 3-fid. Petals broadly oval, 8 to 12 mm. long; achenes glabrous, the beak incurved.
      5. R. glaberrimus.
    Leaves all with an entire margin.
      Stems filiform, rooting at the nodes; leaves linear to lanceolate; petals obovate, 2 to 4 mm. long; achenes glabrous, minutely beaked.
        2. R. reptans.
      Stems erect; basal leaves petioled, the cauline mostly sessile; beak of achene subulate.
        Plants 10 to 25 cm. high; leaf blades oval to elliptic, 3 cm. long or less; petals obovate-oblong, 6 to 8 mm. long------**4. R. alismellus.**
        Plants 30 to 60 cm. high (full-grown); leaf blades oval to lanceolate, often 10 cm. long; petals obovate, 5 to 6 mm. long.
          3. R. alismaefolius.
  Leaves simple or compound, crenate, lobed, or divided.
    Leaves (at least some) pinnately compound. Plants 30 cm. high or more, more or less hirsute.
      Beak of the achene 3 mm. long or more. Leaflets ovate, cleft or toothed; sepals reflexed; petals obovate, 8 to 12 mm. long; head of achenes subglobose----------**17. R. maximus.**
      Beak of the achene short, 1 mm. long or less. Plants 20 to 60 cm high.
        Beak straight or nearly so, 1 mm. long; erect or decumbent plants, often rooting at the nodes; pubescence hirsute; terminal leaflet rhombic-obovate, variously toothed or cleft; petals 4 to 7 mm. long, obovate----------**15. R. macounii.**
        Beak curved, 0.5 mm. long, broad at base; erect, sparingly villous plants; terminal leaflet obovate-cuneate, toothed; petals oblong or obovate, 5 to 6 mm. long----------**16. R. ultramontanus.**

Leaves variously toothed, lobed, or divided, not pinnately compound.
Basal leaves varying from crenate to shallowly lobed.
Basal leaves rotund or flabelliform. Heads of fruit elliptic; achenes pubescent.
Petals broadly obovate, 1 cm. long; basal leaves cuneate-flabelliform; stems 10 cm. high——8. R. saxicola.
Petals oval, 5 to 6 mm. long; basal leaves rotund; stems 20 to 30 cm. high——7. R. inamoenus.
Basal leaves cordate, crenate.
Leaf blades 4 cm. long or more, cordate-ovate. Petals nearly 1 cm. long; plants villous, 20 to 30 cm. high, caulescent.
6. R. subsagittatus.
Leaf blades rounded-cordate, 4 to 20 mm. long. Plants acaulescent, stoloniferous, tufted; heads of fruit globose or oblong; achenes striate——1. R. cymbalaria.
Basal leaves deeply lobed or dissected.
Plants 10 to 15 cm. high.
Stems trailing, rooting at the nodes. Leaves palmately divided, the lobes cuneate-obovate, lobed or toothed; petals obovate, 4 to 5 mm. long——19. R. purshii.
Stems erect.
Leaf segments narrowly linear. Petals obovate, 7 to 18 mm. long; head of achenes globose-oblong; plants glabrous.
11. R. adoneus.
Leaf segments broader.
Basal leaves 3(or 5)-lobed, the lobes oblong; petals spatulate-oblong, 6 to 7 mm. long; achenes with curved beak. Roots tuberous——10. R. jovis.
Basal leaves orbicular to reniform, many-toothed or lobed; petals obovate, 6 to 8 mm. long; achenes with straight beak——9. R. eschscholtzii.
Plants 30 cm. high or more.
Plant aquatic, glabrous or nearly so, with finely dissected leaves. Petals 8 to 12 mm. long, broadly ovate; achenes roughened, the beak prominent and nearly straight——18. R. delphinifolius.
Plants terrestial; leaves not finely dissected.
Plants glabrous; leaves reniform, 3 or 5-parted, the lobes toothed, cuneate-obovate. Petals oblong, 3 to 5 mm. long; heads of achenes oblong, the achenes glabrous, minutely beaked.
12. R. sceleratus.
Plants pubescent or hirsute; basal and often the stem leaves ternate or palmately 3-parted or 3-fid.
Leaves ternate, the leaflets broadly cordate-ovate, 3-parted, the segments toothed or cleft; petals oblong, 2 to 4 mm. long; achenes glabrous, the beak nearly straight. Hirsute annual.
14. R. pennsylvanicus.
Leaves palmately 3-parted, the primary lobes broad, 3-toothed; petals slightly exceeding the sepals; achenes glabrous, the beak curved——13. R. bongardi.

1. Ranunculus cymbalaria Pursh, Fl. Amer. Sept. 392. 1814.

Wet places on plains, upward to 2,700 meters. Labrador to Alaska, southward to New Jersey and California. Our western form is *R. cymbalaria saximontana* Fernald (Rhodora 16: 162. 1914).

2. Ranunculus reptans L. Sp. Pl. 549. 1753.

Borders of ponds in the pinyon belt, upward to 3,000 meters. Labrador to Alaska, southward to New Jersey and Arizona; also in Europe and Asia.

3. Ranunculus alismaefolius Geyer; Benth. Pl. Hartw. 295. 1848.

Ranunculus calthaeflorus Greene, Erythea 3: 45. 1895.

Ranunculus hartwegi Greene, Erythea 3: 45. 1895.

Ranunculus unguiculatus Greene, Pittonia 4: 142. 1900.

Wet places in the aspen, spruce, and alpine belts. British Columbia to California and Colorado.

4. Ranunculus alismellus (A. Gray) Greene, Fl. Franc. 297. 1892.

Ranunculus alismaefolius alismellus A. Gray, Proc. Amer. Acad. 7: 327. 1868.

Wet places in the aspen and spruce belts. Washington to Wyoming, Utah, and California.

5. Ranunculus glaberrimus Hook. Fl. Bor. Amer. 1: 12. 1829.

Ranunculus ellipticus Greene, Pittonia 2: 110. 1890.

Plains, hillsides, and canyons of the artemisia, pinyon, and yellow pine belts. British Columbia to the Dakotas, New Mexico, and California.

6. Ranunculus subsagittatus (A. Gray) Greene, Pittonia 2: 59. 1890.

Ranunculus arizonicus subsagittatus A. Gray, Proc. Amer. Acad. 21: 370. 1886.

Spruce belt region; abundant in De Mott Park, Kaibab Plateau, Utah. Northern Arizona and New Mexico.

7. Ranunculus inamoenus Greene, Pittonia 3: 91. 1896.

Ranunculus utahensis Rydb. Bull. Torrey Club 29: 158. 1902.

Aspen and spruce regions. Montana and Idaho, southward to New Mexico and Arizona.

8. Ranunculus saxicola Rydb. Mem. N. Y. Bot. Gard. 1: 164. 1900.

Spruce belt; La Sal Mountains, Utah. Montana, Wyoming, and Utah.

9. Ranunculus eschscholtzii Schlecht. Animadv. Ranunc. 2: 16. 1820.

Ranunculus alpeophilus A. Nels. Bull. Torrey Club 26: 350. 1899.

Spruce and alpine belts. Alaska to Colorado and California.

10. Ranunculus jovis A. Nels. Bull. Torrey Club 27: 261. 1900.

Aspen, spruce, and subalpine belts. Wyoming, Idaho, and Nevada.

11. Ranunculus adoneus A. Gray, Proc. Acad. Phila. 1863: 56. 1864.

Ranunculus stenolobus Rydb. Bull. Torrey Club 29: 159. 1902.

Spruce belt. Wyoming, Colorado, and Utah.

12. Ranunculus sceleratus L. Sp. Pl. 551. 1753.

Ranunculus eremogenes Greene, Erythea 4: 121. 1896.

Swamps, pools, and ditches through the Great Basin at 1,200 to 2,400 meters. New Brunswick to Florida, westward to Oregon and California; also in Europe and Asia.

13. Ranunculus bongardi Greene, Erythea 3: 54. 1895.

Wet meadows and along running water of the yellow pine, aspen, and spruce belts. Montana to Alaska, southward to Colorado and California.

14. Ranunculus pennsylvanicus L. f. Suppl. Pl. 272. 1781.

Wet meadows of the artemisia, pinyon, and yellow pine belts. Nova Scotia to Georgia, New Mexico, Utah, and British Columbia.

15. Ranunculus macounii Britton, Trans. N. Y. Acad. **12:** 2. 1892.
Ranunculus rivularis Rydb. Bull. Torrey Club **39:** 319. 1912.
Wet meadows of the plains, upward to the yellow pine belt. Ontario to British Columbia, southward to New Mexico, Utah, and Oregon.

16. Ranunculus ultramontanus (Greene) Heller, Muhlenbergia **6:** 11. 1910.
Ranunculus occidentalis ultramontanus Greene, Pittonia **3:** 13. 1896.
Meadows of the artemisia, yellow pine, and aspen belts. Western Nevada and California.

17. Ranunculus maximus Greene, Bull. Torrey Club **14:** 118. 1887.
Ranunculus orthorhynchus platyphyllus A. Gray, Proc. Amer. Acad. **21:** 377. 1886.
Wet sunny places in the pinyon belt, upward to the spruce belt. British Columbia to California and Nevada.

18. Ranunculus delphinifolius Torr.; Eaton, Man. Bot. ed. 2. 395. 1818.
WATER BUTTERCUP.
In shallow water and pools. Maine to North Carolina, westward to Kansas, Utah (according to Rydberg), and British Columbia. The emersed form has ternate leaves with cuneate-flabelliform, many-toothed or cleft segments.

19. Ranunculus purshii Richards. Bot. App. Frankl. Journ. 741. 1823.
Ranunculus limosus Nutt.; Torr. & Gray, Fl. N. Amer. **1:** 20. 1838.
Ponds and wet places, at 1,200 to 3,000 meters. Alaska to Nova Scotia, southward to Nevada and New Mexico.

20. Ranunculus arvensis L. Sp. Pl. 555. 1753.
Waste places; introduced from the Old World; reported by Rydberg from Utah. New Jersey to Ohio and Utah.

14. BECKWITHIA Jepson

Scape 1-flowered, bractless; achenes inflated, 8 mm. long_____**1. B. andersonii.**
Scape 2 or 3-flowered, bracted; achenes flattened, about 5 mm. long.
2. B. juniperina.

1. Beckwithia andersonii (A. Gray) Jepson, Erythea **6:** 99. 1898.
Ranunculus andersonii A. Gray, Proc. Amer. Acad. **7:** 327. 1868.
Foothills and canyons of the artemisia belt, upward to the spruce belt. Nevada.

2. Beckwithia juniperina (Jones) Heller, Muhlenbergia **1:** 144. 1906.
Ranunculus andersonii tenellus S. Wats. in King, Geol. Expl. 40th Par. **5:** 7. *pl. 1.* 1871.
Ranunculus juniperinus Jones, Proc. Calif. Acad. II. **5:** 616. 1895.
Pinyon belt; Beaver Dam Mountains. Western Utah and Nevada.

15. BATRACHIUM S. F. Gray

Leaves of two types, the upper (floating) reniform, cleft or toothed with broad rounded teeth, the submerged finely dissected into capillary divisions_____**3. B. grayanum.**
Leaves all submerged, with linear or capillary divisions.
Achenes apiculate; leaves petioled_____**1. B. trichopyllum.**
Achenes long-beaked; leaves sessile_____**2. B. circinatum.**

1. Batrachium trichophyllum (Chaix) Bossch, Prodr. Fl. Bat. 5. 1850.
Ranunculus trichophyllus Chaix; Vill. Prosp. Pl. Dauph. **1:** 335. 1786.
In brooks and pools at 1,200 to 2,700 meters. Canada to North Carolina and California; also in Europe and Asia.

2. Batrachium circinatum (Sibth.) Reichenb.; Spach, Hist. Nat. Veg. **7:** 201. 1839.

Ranunculus circinatus Sibth. "Fl. Oxon. 175. 1794."

Sevier River, above Marysvale, Utah. Ontario to New York, westward to Nevada.

3. Batrachium grayanum (Freyn) Rydb. Fl. Rocky Mount. 294. 1917.

Ranunculus grayanus Freyn, Deutsch. Bot. Monatsschr. **8:** 179. 1890.

Ponds and wet places; Fish Lake, Utah. Montana to Utah, California, and Alaska.

16. THALICTRUM L. MEADOWRUE

Plants 20 cm. high or less (rarely higher). Leaves mostly basal; leaflets cuneate-obovate to orbicular, 3 to 10 mm. long; flowers perfect; filaments filiform; achenes obovoid, thick-ribbed ..... **1. T. alpinum.**

Plants taller. Stems more or less leafy.

Flowers perfect; filaments clavate. Achenes half-rhombic, with straight back; leaflets cordate or rounded at base, 3 or 5-lobed ..... **2. T. sparsiflorum.**

Flowers dioecious or polygamous; filaments filiform. Leaves three or four times ternate.

Leaflets strongly veined, of a firm texture, glabrous or nearly so, rounded in outline, 15 mm. long or less. Achenes oblong, thick-walled, 5 mm. long; panicle narrow ..... **3. T. venulosum.**

Leaflets of thin texture, not strongly veined, more or less minutely puberulent or glandular.

Achenes oblong, 4 times longer than broad, symmetrical. Leaflets commonly over 2 cm. long ..... **4. T. occidentale.**

Achenes commonly less than 3 times as long as broad.

Achenes 1-ribbed (the anastomosing veins faint), obovate to orbicular, 5 mm. long or less ..... **5. T. polycarpum.**

Achenes distinctly 3-ribbed.

Achenes scarcely oblique; leaflets mostly 20 mm. long or more, pale beneath ..... **6. T. megacarpum.**

Achenes decidedly oblique; leaflets 15 mm. long or less. **7. T. fendleri.**

1. Thalictrum alpinum L. Sp. Pl.. 545. 1753.

Thalictrum elegantulum Greene, Leaflets **2:** 93. 1910.

Spruce and alpine belts; northern Nevada. Greenland to Alaska, southward to Newfoundland, Colorado, and California; also in Europe and northern Asia.

2. Thalictrum sparsiflorum Turcz. in Fisch. & Mey. Ind. Sem. Hort. Petrop. **1:** 40. 1835.

Yellow pine, aspen, and spruce belts. Utah to California and Alaska; northern Asia.

3. Thalictrum venulosum Trel. Proc. Bost. Soc. Nat. Hist. **23:** 302. 1886.

Shaded places, upward to 2,700 meters; northern Utah. Manitoba to Colorado and Utah.

4. Thalictrum occidentale A. Gray, Proc. Amer. Acad. **8:** 372. 1872.

Aspen and spruce belts. Alberta and British Columbia to California and New Mexico.

5. Thalictrum polycarpum (Torr.) S. Wats. Proc. Amer. Acad. **14:** 288. 1879.

Thalictrum fendleri polycarpum Torr. U. S. Rep. Expl. Miss. Pacif. **4:** 61. 1857.

Along streams at 2,400 to 3,000 meters. California, Oregon, and Nevada.

6. **Thalictrum megacarpum** Torr. in Frém. Rep. Exped. Rocky Mount. 87. 1845.

Aspen and spruce belts. Montana to Colorado, Idaho, and Nevada.

7. **Thalictrum fendleri** Engelm. in A. Gray, Mem. Amer. Acad. n. ser. 4: 5. 1849.

Yellow pine belt, upward to 3,300 meters. Wyoming to New Mexico, Arizona, and Nevada.

46. BERBERIDACEAE. Barberry Family

Herbs or shrubs with alternate, simple or compound leaves (in our species pinnate); flowers racemose or axillary, perfect, 3-merous; sepals and petals free; stamens as many as the petals; carpel normally 1; style 1; stigma dilated; ovary 1-celled, the ovules 2 or more; fruit (in our species) a berry.

1. ODOSTEMON Raf. HOLLYGRAPE

Plants dwarf; leaflets 3 or 5, ovate or oblong, 4 to 8 cm. long, bristle-toothed; berry 5 to 7 mm. in diameter ..... 1. O. repens.

Plants 1 to 3 meters high; leaflets 3 to 7, ovate or oblong, 1 to 2 cm. long, sinuate-toothed, the teeth 1 to 4, large, spinescent; berry 10 mm. or more in diameter ..... 2. O. fremontii.

1. **Odostemon repens** (Lindl.) Cockerell, Univ. Mo. Stud. Sci. 2: 125. 1911.

Berberis repens Lindl. in Edwards's Bot. Reg. 14: *pl. 1176.* 1828.

Pinyon, yellow pine, aspen, and spruce belts. Alberta to western Nebraska, New Mexico, and California.

2. **Odostemon fremontii** (Torr.) Rydb. Bull. Torrey Club 33: 141. 1906.

Berberis fremontii Torr. U. S. & Mex. Bound. Bot. 30. 1859.

Pinyon belt. Southern Colorado and New Mexico, westward to Nevada and Arizona.

Odostemon aquifolium, the Oregon hollygrape, is the State flower of Oregon.

47. PAPAVERACEAE. Poppy Family

Annual or perennial herbs; leaves mostly alternate, entire, pinnatifid or dissected, estipulate; inflorescence various; sepals 2, 3, or rarely 4, free, caducous; petals 4 to 6 or more; stamens numerous, free; ovary free, 1 to many-celled, the placentae parietal; style short or wanting; stigmas as many as the placentae; fruit capsular, the valves separating in many cases from the placentae and becoming podlike.

Leaves entire or at most shallowly toothed.

Leaves entire, linear; flowers solitary, 1 cm. in diameter; petals yellowish; carpels many, becoming distinct; subscapose annual. 1. PLATYSTEMON.

Leaves toothed or entire, cuneate-oblanceolate, hirsute or long-villous; peduncles 1 to many-flowered; flowers 3 to 6 cm. in diameter, yellow or white; carpels 4 to 6; capsule 1-celled, dehiscent above; biennials or perennials. 2. ARCTOMECON.

Leaves pinnatifid or dissected.

Leaves pinnatifid, prickly-toothed; flowers large, white or yellowish; sepals beaked with spines; capsule 1-celled, the valves separating from the placental ribs; coarse, hispid or spiny biennials or perennials. 3. ARGEMONE.

Leaves dissected, the ultimate divisions oblong or linear; flowers yellow; sepals coherent, forming a hood; petals 4; capsule linear, 10-ribbed. 4. ESCHSCHOLTZIA.

1. PLATYSTEMON Benth.

1. **Platystemon californicus** Benth. Trans. Hort. Soc. London II. 1: 405. 1835. CREAMCUPS.

Covillea and artemisia belts, upward to 1,300 meters. Southwestern Utah and northern Arizona.

2. ARCTOMECON Torr. DESERTPOPPY

Petals white, about 1.5 cm. long; leaves sparingly villous, 3-toothed; plants low ---------- 1. A. humilis.

Petals white or yellow, 2 to 3.5 cm. long; leaves densely villous, 3-toothed; plants 30 to 50 cm. high.

Peduncles 1-flowered; petals white ---------- 2. A. merriami.

Peduncles many-flowered; petals yellow ---------- 3. A. californica.

1. **Arctomecon humilis** Coville, Proc. Biol. Soc. Washington 7: 67. 1892.

Mesas and barren clay hills of the upper Covillea belt. Southwestern Utah.

2. **Arctomecon merriami** Coville, Proc. Biol. Soc. Washington 7: 66. 1892.

Plains and slopes of the Covillea belt. Southern Nevada.

3. **Arctomecon californica** Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 312. *pl. 2.* 1845.

Plains and slopes of the Covillea belt. Southern Nevada.

3. ARGEMONE L. PRICKLEPOPPY

1. **Argemone hispida** A. Gray, Mem. Amer. Acad. n. ser. 4: 5. 1849.

Argemone munita Dur. & Hilg. U. S. Rep. Expl. Miss. Pac. 5 [3]: 5. *pl. 1.* 1855.

Argemone rotundata Rydb. Bull. Torrey Club 29: 160. 1902.

Artemisia and pinyon belts. Wyoming to New Mexico and California.

4. ESCHSCHOLTZIA Cham. CALIFORNIA-POPPY

Petals small, less than 1 cm. long.

Plants 10 to 15 cm. high; leaves mostly basal ---------- 1. E. ludens.

Plants 20 to 30 cm. high; stem leaves numerous ---------- 2. E. minutiflora.

Petals large, over 1 cm. long.

Peduncles not scapiform; cauline leaves numerous ---------- 5. E. leptandra.

Peduncles scapiform; leaves mostly basal.

Petals 1.5 cm. long or less; plants subscapose ---------- 4. E. glyptosperma.

Petals about 2.5 cm. long; stem leaves few ---------- 3. E. mexicana.

1. **Eschscholtzia ludens** Greene, Pittonia 5: 272. 1905.

Plains and slopes of the Covillea belt. Southwestern Utah, southern Nevada, and California.

2. **Eschscholtzia minutiflora** S. Wats. Proc. Amer. Acad. 11: 122. 1876.

Eschscholtzia minuscula Greene, Pittonia 5: 270. 1905.

Plains and slopes of the Covillea and artemisia belts. Southern Utah, Arizona, and Nevada.

3. **Eschscholtzia mexicana** Greene, Bull. Calif. Acad. 1: 69. 1885.

Eschscholtzia douglasii parvula A. Gray, Pl. Wright. 2: 10. 1853.

Plains and hillsides; Mica Springs, Nevada. Western Texas to Nevada and southward.

4. **Eschscholtzia glyptosperma** Greene, Bull. Calif. Acad. 1: 70. 1885.

Canyons and slopes of the Covillea belt. Southwestern Utah and Arizona, westward to California.

5. Eschscholtzia leptandra Greene, Pittonia **1**: 170. 1888.

Eschscholtzia nevadensis Fedde, Repert. Nov. Sp. Fedde **2**: 146. 1906.

Slopes of the artemisia and pinyon belts. Western Nevada and eastern California.

The common California-poppy, *Eschscholtzia californica*, is the State flower of California.

48. FUMARIACEAE. Fumitory Family

Annual, biennial, or perennial herbs; leaves estipulate, alternate or basal, dissected; flowers irregular, racemose or variously clustered; sepals 2, small; petals 4, somewhat united; stamens 6, diadelphous, the anthers 1 or 2-celled; style 1; stigma 2-lobed; ovary 1-celled, the placentae 2, parietal; fruit 1-seeded and indehiscent or a several-seeded capsule.

Outer petals both spurred. Plant stemless; leaves ternately compound or dissected; flowers white or pink; capsule fusiform_____1. **BIKUKULLA.**

One of the outer petals spurred.

Fruit an elongate many-seeded capsule_____2. **CAPNOIDES.**

Fruit indehiscent, globular, 1-seeded. Diffuse annuals; ultimate leaf segments small, linear; flowers (in our species) purplish or rose-colored, 5 to 7 mm. long, the spur short_____3. **FUMARIA.**

1. BIKUKULLA Adans.

1. **Bikukulla uniflora** (Kellogg) Howell, Fl. Northw. Amer. **1**: 34. 1897.

Dicentra uniflora Kellogg, Proc. Calif. Acad. **4**: 141. 1871.

Aspen and spruce belts. Washington to California, Utah, and Wyoming.

2. CAPNOIDES Adans.

Corolla varying from white to pink or purplish; plants stout; ultimate leaf segments lanceolate, 1.2 to 2.5 cm. long_____1. **C. brandegei.**

Corolla yellow; plants weak, slender; ultimate leaf segments linear-oblong or oblong.

Spur half as long as the body of the flower_____2. **C. aureum.**

Spur equaling the body of the flower or nearly so_____3. **C. montanum.**

1. **Capnoides brandegei** (S. Wats.) Heller, Cat. N. Amer. Pl. 4. 1898.

Corydalis brandegei S. Wats. Bot. Calif. **2**: 430. 1880.

Spruce belt. Central Colorado, Utah, and New Mexico.

2. **Capnoides aureum** (Willd.) Kuntze, Rev. Gen. Pl. **1**: 14. 1891.

Corydalis aurea Willd. Enum. Pl. 740. 1809.

Aspen region and upward; apparently rare in Utah. Canada to Pennsylvania, Texas, and California.

3. **Capnoides montanum** (Engelm.) Britton, Mem. Torrey Club **5**: 166. 1894.

Corydalis montana Engelm.; Wood, Bot. & Flor. 34. 1870.

Corydalis gooddingii Fedde, Repert. Sp. Nov. Fedde **10**: 313. 1912.

Dry slopes in the basin region, upward to 3,000 meters. South Dakota to Nevada and south to Mexico. This is the common species throughout the region.

3. FUMARIA L. Fumitory

1. **Fumaria officinalis** L. Sp. Pl. 700. 1753.

Near Salt Lake City; introduced from Europe. Nova Scotia to Florida, westward to Utah.

49. BRASSICACEAE. Mustard Family

Herbs with alternate, entire to finely dissected leaves; flowers in racemes or spikes, perfect, regular or nearly so, 4-merous; sepals deciduous; petals hypogynous, with spreading limb; stamens usually 6, tetradynamous (the inner 4 longer); style 1; ovary mostly 2-celled, superior (partly inferior in *Subularia*), the placentae marginal; fruit a 2-celled capsule, usually dehiscent.

Ovary and pod long-stipitate, elongate-linear. Petals long-clawed, yellow or ochroleucous; anthers linear, curved and coiled; caulescent biennials or perennials----------1. **STANLEYA.**

Ovary and pod sessile or short-stipitate.

Pods more or less didymous, the cells suborbicular to elliptic. Pubescence stellate.

Cells of pod flat, margined; petals light yellow or white; biennials or perennials with lanceolate sinuate-dentate leaves----21. **DITHYREA.**

Cells of pod inflated; petals yellow; cespitose perennials with orbicular to spatulate, entire or sinuate-dentate leaves----------22. **PHYSARIA.**

Pods not didymous.

Plants acaulescent.

Leaves subulate, 2 to 7 cm. long. Dwarf perennial aquatic with minute white flowers; style none; pod ovoid or globular, with broad partition----------6. **SUBULARIA.**

Leaves broader, not subulate.

Plants low annuals.

Leaves hastate or lyrate, sometimes ovate, entire; petals spatulate, white, small; pod suborbicular, flat, with broad partition; seeds broadly winged----------20. **IDAHOA.**

Leaves oblong to lanceolate; petals yellow or white; pods elliptic to linear, 12 mm. long or less.----------28. **DRABA.**

Plants perennials.

Petals pink or purple, with long claws and broad blades; pods flat, 2 to 4 cm. long, 3 to 7 mm. wide. Leaves glandular-hirsute to tomentose.----------38. **PARRYA.**

Petals yellow or white, small; pods elliptic to linear, 12 mm. long or less.----------28. **DRABA.**

Plants caulescent, often with only a few stem leaves.

Pods long-stipitate ----------1. **STANLEYA.**

Pods sessile or short-stipitate.

Pods not more than 3 times as long as broad.

Pods compressed parallel to the broad partition.

Pedicels recurved. Flowers white or purplish, in elongate racemes, minute; annuals with linear to oblanceolate, entire, toothed, or pinnatifid leaves; pods orbicular, 1-seeded.

Pods with uncinate hairs, wingless. Petals linear or wanting. **29. ATHYSANUS.**

Pods with winged, toothed, or perforated margin. **30. THYSANOCARPUS.**

Pedicels not recurved.

Pods oblong, obtuse or acute; annuals or perennials, mostly stellate-pubescent; petals yellow or white.------28. **DRABA.**

Pods orbicular, notched at the apex; annual, densely stellate-canescent; leaves linear-oblong or spatulate; petals white, obovate to linear.----------36. **ALYSSUM.**

Pods compressed contrary to the narrow partition, or not at all compressed.
Pods not at all compressed, or only slightly so.
Pods obovoid. Style slender; seeds few, marginless; annuals with lanceolate or sagittate, entire or toothed leaves; flowers yellowish or greenish_____26. CAMELINA.
Pods not obovoid.
Pubescence simple or none; pods subglobose or cylindric. Annuals or perennials with pinnately lobed or dissected leaves; flowers yellow_____18. RADICULA.
Pubescence stellate; pods globose. Style slender; flowers yellow.
Pods not reticulate, inflated, dehiscent; annuals or tufted perennials; leaves not sagittate_23. LESQUERELLA.
Pods reticulate, indehiscent, 2 to 3 mm. in diameter; annual or biennial with sagittate-clasping leaves.
27. NESLIA.

Pods evidently compressed.
Petals yellow. Pods oval or oblong, 8 to 15 mm. long, winged all around; style none; biennial, 1 meter high or less; lower leaves oblanceolate, the upper sagittate-clasping.
11. ISATIS.

Petals white or purplish.
Pods obcordate, 6 to 8 mm. long, the valves boat-shaped. Annual with lyrate-pinnatifid to arrow-shaped leaves; petals small_____25. BURSA.
Pods orbicular to oblong, obtuse or notched.
Pods wingless, elliptic, 4 mm. long. Low spreading annual; leaves entire to pinnatifid, oblanceolate to linear, glabrous or minutely stellate; petals small.
24. HUTCHINSIA.
Pods more or less winged, at least near apex.
Seeds solitary in each cell; leaves entire, toothed, or dissected; pods mostly orbicular; style short or wanting.
7. LEPIDIUM.
Seeds several in each cell; leaves entire or toothed, often clasping; pods orbicular to cuneate-oblong; style slender or wanting_____8. THLASPI.

Pods at least 4 times as long as broad.
Pods long-beaked.
Pods quadrangular, 15 mm. long or more, 3 to 4 mm. wide, the beak flat. Glabrous annual, 30 to 40 cm. high; leaves pinnately lobed or toothed; petals white or purplish-veined.
12. ERUCA.
Pods terete or flattened.
Pods strongly flattened parallel to the partition, 3 mm. wide or more. Petals pink or purple, with long claws.
38. PARRYA.

Pods terete or angled, scarcely flattened.
Beak flat, equaling the body of the pod or shorter. Annuals, 30 to 60 cm. high, more or less hispid or hirsute; leaves runcinate-pinnatifid or lobed_____13. SINAPIS.

Beak conic or angled, not perceptably flattened.
Leaves linear to linear-oblanceolate, the basal ovate-spatulate, entire or nearly so (see below).
5. STREPTANTHUS.
Leaves broader, the lower lobed or pinnatifid.
Petals white or purple, purple-veined; leaves lyrate-pinnatifid; pods with a stout tapering beak.
15. RAPHANUS.
Petals yellow, or often white, not purple-veined; leaves lyrate, incised, or pinnatifid; pods elongate-linear, terete or angled----------**14. BRASSICA.**
Pods not distinctly beaked, often tipped by the persistent style.
Petals undulate-crisped, with broad claw, the blade obsolete, greenish to purple.
Calyx urceolate, closed----------**4. CAULANTHUS.**
Calyx campanulate, open----------**5. STREPTANTHUS.**
Petals not undulate-crisped, the blade flat, linear to suborbicular.
Calyx ovate-oblong to campanulate.
Petals yellow (yellowish white in Nos. 10 and 39).
Pods tapering to apex, 15 to 20 mm. long, hirsutulous. Leaves hirsute, pinnatifid to hastate; petals spatulate, small; coarse introduced annual----------**9. ERYSIMUM.**
Pods cylindric or clavate.
Pubescence of branched hairs.
Leaves linear or oblanceolate, entire to sinuate-toothed.
Cauline hairs appressed, bifid----------**35. CHEIRINIA.**
Leaves bipinnatifid to finely dissected. Flowers small.
32. SOPHIA.
Pubescence of simple hairs or none.
Stem leaves oval or elliptic, cordate-clasping, entire or denticulate, glabrous. Petals oblanceolate, 8 mm. long; pods 8 to 10 cm. long----------**39. CONRINGIA.**
Stem leaves linear to linear-oblanceolate, if broader, pinnatifid or pinnate.
Plants perennials, with creeping rootstocks, glabrous or strigose. Petals large--**2. SCHOENOCRAMBE.**
Plants annuals or perennials with taproots.
Plants glabrous; leaves lyrate-pinnatifid, the lobes rounded or elliptic. Petals large--**16. CAMPE.**
Plants more or less pubescent; leaves pinnatifid with oblong or linear lobes.
Petals spatulate, 6 to 8 mm. long; pods 7 to 10 cm. long, narrow----------**10. NORTA.**
Petals rounded, small; pods not over 15 mm. long.
18. RADICULA.
Petals white or purple.
Pubescence of simple hairs or none.
Plant an aquatic perennial, rooting at the nodes. Leaves pinnatifid or pinnate, with orbicular to oblong lobes; petals small, spatulate; pods 1 to 2 cm. long, 3 mm. wide, curved----------**17. SISYMBRIUM.**
Plants erect annuals or perennials, not rooting at the nodes

Anthers not sagittate. Sepals equal; petals spatulate to obovate; pods narrow; seeds wingless; leaves entire to pinnate_____19. **CARDAMINE.**
Anthers sagittate.
Sepals oblong to linear, short; petals with a distinct blade; pods oblong to narrowly linear.
3. THELYPODIUM.
Sepals ovate or oblong, colored, equal or saccate at base; petals linear or with a distinct blade, often undulate-crisped_____5. **STREPTANTHUS.**
Pubescence stellate or of branched hairs (often none in *Arabis*).
Pods lanceolate. Low cespitose perennials. Leaves pinnatifid, densely stellate-pubescent____31. **SMELOWSKIA.**
Pods linear.
Flowers sessile. Petals pinkish, long-clawed; pods 5 to 6 cm. long, narrow; pubescent annual with spreading branches; leaves oblanceolate to lanceolate, 4 cm. long or less_____37. **MALCOLMIA.**
Flowers more or less distinctly pedicelled.
Leaves chiefly basal, oblanceolate, obtuse, entire or toothed; stem leaves reduced; petals small; pods very slender, 1 to 1.5 cm. long; annuals.
33. ARABIDOPSIS.
Stem leaves numerous, not much reduced; annuals or perennials_____34. **ARABIS**

1. **STANLEYA** Nutt.

Middle stem leaves sessile, clasping or auriculate (all leaves entire or nearly so). Petals 12 to 18 mm. long; pods torulose, 4 to 5 cm. long; plants glabrous or puberulent, 1 meter high or less_____1. **S. viridiflora.**
Middle stem leaves petioled, or sessile with a narrow base, neither auriculate nor clasping.
Inflorescence long-stalked, the uppermost leaves reduced, linear, the lower oblong to elliptic, entire. Petals and sepals subequal; pods 7 to 10 cm. long (including stipe); plants glabrous, 1 meter high or less.
2. S. elata.
Infloresence short-stalked, the uppermost leaves not linear.
Lower leaves lyrate-pinnatifid, with oblong or elliptic lobes, the upper petioled, hastate; blades of petals rounded-oval, ochroleucous, exceeding the sepals. Pods about 12 cm. long; plants 1 meter high or less.
3. S. albescens.
Leaves entire, pinnatifid, or pinnate, not lyrate; blades of petals linear-oblong to elliptic, bright yellow.
Plants more or less hirsute or canescent; blades of petals linear-oblong, one-half to three-fourths as long as the claw; pods 5 to 7 cm. long.
4. S. pinnata.
Plants glabrous or puberulent; blades of petals elliptic, nearly equaling the claw; pods 7 to 10 cm. long_____5. **S. arcuata.**

1. **Stanleya viridiflora** Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 98. 1838.
Stanleya collina Jones, Zoe **8**: 284. 1893.

Dry slopes of the artemisia and pinyon belts. Southern Wyoming, Utah, and Nevada.

2. Stanleya elata Jones, Zoe **2**: 16. 1891. SQUAWCABBAGE.

Plains, canyons, and dry slopes of the Covillea and artemisia belts. Central Nevada and California.

3. Stanleya albescens Jones, Zoe **2**: 17. 1891.

Artemisia plains and dry hillsides. Southwestern Colorado, Utah, and Arizona.

4. Stanleya pinnata (Pursh) Britton, Trans. N. Y. Acad. **8**: 62. 1889.

Cleome pinnata Pursh, Fl. Amer. Sept. 739. 1814.

Plains and dry slopes of the artemisia and pinyon belts. South Dakota to **Nebraska, and Utah.**

5. Stanleya arcuata Rydb. Bull. Torrey Club **29**: 232. 1902.

Stanleya canescens Rydb. Bull. Torrey Club **29**: 232. 1902.

Plains and hillsides of the Covillea and artemisia belts. Wyoming to northwestern New Mexico, and California.

2. SCHOENOCRAMBE Greene

Leaves linear; petals spatulate, 6 to 8 mm. long; pod 3 to 5 cm. long, 1 mm. thick----------**1. S. linifolia.**

Leaves (lowest) oblanceolate, pinnatifid or pinnate; petals 7 to 10 mm. long; pod 5 to 6 cm. long, 1 mm. thick----------**2. S. pinnata.**

1. Schoenocrambe linifolia (Nutt.) Greene, Pittonia **3**: 127. 1896.

Nasturtium linifolium Nutt. Journ. Acad. Phila. **7**: 12. 1834.

Schoenocrambe decumbens Rydb. Bull. Torrey Club **31**: 409. 1904.

Plains and canyons of the artemisia and pinyon belts. Montana to British Columbia, southward to New Mexico and Nevada.

2. Schoenocrambe pinnata Greene, Pittonia **3**: 127. 1896.

Plains and slopes of the artemisia, pinyon, yellow pine, and aspen belts. **Utah and Nevada.**

3. THELYPODIUM Endl.

Stem leaves neither clasping nor auriculate.

Stem leaves sessile, linear-lanceolate. Inflorescence crowded; petals white or purplish, 6 mm. long; pods 2 cm. long or less, spreading.
8. T. integrifolium.

Stem leaves petioled.

Leaves ovate or ovate-lanceolate, irregularly toothed or pinnatifid or entire.

Petals white, 10 mm. long; pods 4 to 7 cm. long, spreading; pedicels 4 to 8 mm. long----------10. T. laciniatum.

Leaves linear to oblong-lanceolate or lanceolate.

Leaves linear to lanceolate, entire, toothed, or pinnatifid; petals white, 6 mm. long; pods 3 to 7 mm. long; pedicels 1 cm. long or more.
9. T. wrightii.

Leaves oblong or oblanceolate, sinuate-toothed or pinnatifid; petals white, 6 mm. long; pods 3 cm. or more, reflexed; pedicels 2 to 3 mm. long----------11. T. lasiophyllum.

Stem leaves clasping or auriculate.

Inflorescence dense, spikelike. Leaves oblong or oblong-lanceolate; petals about 7 mm. long, narrow; pods 1 to 2 cm. long----**1. T. brachycarpum.**

Inflorescence open, not spikelike.

Petals 12 mm. long or more, purplish or white. Pods 3 cm. long or more.

Stipe 3 to 4 mm. long; basal leaves oblanceolate, coarsely toothed; plants 0.6 to 1.4 meters high----------**5. T. ambiguum.**

Stipe very short; basal leaves lanceolate, entire; plants 1 meter high or less——6. T. nuttallii.

Petals about 8 mm. long.

Plants about 60 cm. high; stems leafy; auricles of leaves blunt.

Pods 2 to 3.5 cm. long, ascending or erect; stipe 1 mm. long or more; petals purplish, 4 mm. long or more——2. T. sagittatum.

Pods about 7 cm. long; stipe very short or none; petals 8 mm. long, pale purple——7. T. elegans.

Plants slender, 20 to 40 cm. high (rarely higher); stems naked or more or less leafy above; auricles of leaves acutish.

Stems leafy. Leaves oblanceolate to linear-oblong; petals white, about 8 mm. long; pods about 3 cm. long, falcate, reflexed; pedicels and stipe very short——12. T. cooperi.

Stems naked or with few leaves.

Petals about 5 mm. long; pods 15 to 20 mm. long; leaves oblanceolate to oblong——3. T. ovalifolium.

Petals about 8 mm. long; pods 2 cm. long or more; leaves lanceolate to linear-oblong——4. T. flexuosum.

1. Thelypodium brachycarpum Torr. in Wilkes, U. S. Expl. Exped. **17**: 231. *pl. 1.* 1874.

Meadows and mountain valleys of the artemisia and pinyon belts. Oregon, California, and Nevada.

2. Thelypodium sagittatum (Nutt.) Endl.; Walp. Repert. Bot. **1**: 172. 1842.

Pachypodium sagittatum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 97. 1838.

Thelypodium torulosum Heller, Bull. Torrey Club **25**: 265. 1898.

Thelypodium palmeri Rydb. Bull. Torrey Club **34**: 432. 1907.

In alkaline valleys and artemisia plains. Wyoming to Utah and westward.

3. Thelypodium ovalifolium Rydb. Bull. Torrey Club **30**: 253. 1903.

Panguitch Lake, Utah. Perhaps only a reduced form of the preceding species.

4. Thelypodium flexuosum Robinson in A. Gray, Syn. Fl. **1**[1]: 175. 1895.

Alkaline valleys and artemisia plains. Southwestern Utah to California and Oregon.

5. Thelypodium ambiguum S. Wats. Proc. Amer. Acad. **14**: 290. 1879.

Artemisia plains. Southern Utah and Arizona.

6. Thelypodium nuttallii S. Wats. in King, Geol. Expl. 40th Par. **5**: 26. 1871.

Thelypodium paniculatum A. Nels. Bull. Torrey Club **26**: 126. 1899.

Plains and alkaline valleys, upward to the pinyon belt. Utah and Nevada to Oregon and Washington.

7. Thelypodium elegans Jones, Zoe **4**: 265. 1893.

Artemisia plains and dry mountain sides, upward to the aspen belt. Colorado and Utah.

8. Thelypodium integrifolium (Nutt.) Endl.; Walp. Repert. Bot. **1**: 172. 1842.

Pachypodium integrifolium Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 96. 1838.

Plains and mountain sides, upward to the aspen belt. Nebraska to Washington, southward to New Mexico and California.

9. Thelypodium wrightii A. Gray, Pl. Wright. **1**: 7. 1852.

Rocky places of the Covillea, artemisia, and pinyon belts. Colorado to Nevada and southward.

10. Thelypodium laciniatum (Hook.) Endl.; Walp. Repert. Bot. **1**: 172. 1842.
Macropodium laciniatum Hook. Fl. Bor. Amer. **1**: 43. 1829.
Plains and rocky hillsides of the artemisia belt. Washington to California and Nevada.

11. Thelypodium lasiophyllum (Hook. & Arn.) Greene, Bull. Torrey Club **13**: 142. 1886.
Turritis lasiophylla Hook. & Arn. Bot. Beechey Voy. 321. 1840.
Thelypodium utahense Rydb. Bull Torrey Club **29**: 233. 1902.
Sandy and rocky soil of the Covillea and artemisia belts. Utah to California and Washington.

12. Thelypodium cooperi S. Wats. Proc. Amer. Acad. **12**: 246. 1877.
Rocky hillsides of the Covillea belt. Arizona, southern Nevada, and southern California.

4. CAULANTHUS S. Wats.

Plants sparingly pilose or hirsute. Leaves toothed or pinnatifid, the cauline reduced; sepals 6 to 8 mm. long, the petals slightly longer; pod 6 cm. long or more, about 1 mm. wide, spreading or reflexed_____1. C. pilosus.
Plants usually glabrous (leaves and flowers excepted in some cases).
Flowers about 6 mm. long, horizontal or deflexed. Pods slender, torulose, 6 ot 9 cm. long; lower leaves hastate, long-petioled_____5. C. hastatus.
Flowers larger; sepals 8 mm. loug or more.
Calyx pubescent (only at the base in No. 2a). Lower leaves lyrately toothed or pinnatifid, or sometimes entire, pubescent or glabrous; petals 15 to 20 mm. long; pods terete, 6 to 9 cm. long, 2 mm. wide; stems fistulous.
Sepals pubescent _____2. C. crassicaulis.
Sepals glabrous_____2a. C. crassicaulis glaber.
Calyx glabrous. Stems not fistulous.
Lower leaves runcinate-pinnatifid; petals slightly exceeding the sepals; pods terete, 10 cm. long or more, 2 mm. wide_____3. C. procerus.
Lower leaves ovate or lanceolate, subentire, long-petioled; petals exserted and recurved; pods terete, 7 to 10 cm. long, 2 mm. wide.
4. C. glaucus.

1. Caulanthus pilosus S. Wats. in King, Geol. Expl. 40th Par. **5**: 27. 1871.
Artemisia plains and stony hillsides. Eastern California to Nevada and Idaho.

2. Caulanthus crassicaulis (Torr.) S. Wats. in King, Geol. Expl. 40th Par. **5**: 27. 1871.
Streptanthus crassicaulis Torr. in Stansb. Expl. Great Salt Lake 383. *pl. 1*. 1852.
Artemisia plains, rocky canyons, and mountain sides of the pinyon belt. Utah to Central California and Idaho.

2a. Caulanthus crassicaulis glaber Jones, Zoe **4**: 266. 1893.
Plains and dry hillsides of the artemisia and pinyon belts. Southern Utah and eastern Nevada.

3. Caulanthus procerus (Brewer) S. Wats. in King, Geol. Expl. 40th Par. **5**: 27. 1871.
Streptanthus procerus Brewer; A. Gray, Proc. Amer. Acad. **6**: 519. 1865.
Foothills and mountain sides, upward to the spruce belt. Central Utah to Central California.

4. Caulanthus glaucus S. Wats. Proc. Amer. Acad. **17**: 364. 1882.

Artemisia plains and dry hillsides. Nevada and eastern California.

5. Caulanthus hastatus S. Wats. in King, Geol. Expl. 40th Par. **5**: 28. *pl. 3.* 1871.

Stony slopes and canyons of the aspen and spruce belts. Central Utah to Oregon.

5. STREPTANTHUS Nutt.

Leaves not clasping, ovate-spatulate to linear (above). Flowers white, 4 to 6 mm. long, spreading or reflexed; pods reflexed, straight, 2.5 to 4 cm. long, beaked ---------- **1. S. longirostris.**

Leaves clasping. Sepals 8 mm. long or more.

Stem leaves mostly obtuse, entire. Pods 5 to 15 cm. long, ascending or spreading; petals purple or white, 12 mm. long.

Branches of the inflorescence with round-cordate bracts; lower leaves spatulate, coarsely toothed; pods recurved, about 2 mm. wide. **2. S. tortuosus.**

Branches of the inflorescence without bracts; lower leaves spatulate, oblanceolate, or ovate, somewhat toothed; pods spreading, 5 to 6 mm. wide ---------- **3. S. cordatus.**

Stem leaves acute, ovate or oblong. Petals 10 mm. long or more; pods more or less torulose, 4 to 10 cm. long, 2 mm. wide or less.

Pods stipitate, beaked, the beak about 5 mm. long; basal leaves obovate-spatulate, toothed above ---------- **4. S. crassifolius.**

Pods sessile, beaked, the beak 2 mm. long or less; basal leaves obovate, laciniate-toothed ---------- **5. S. wyomingensis.**

1. Streptanthus longirostris S. Wats. Proc. Amer. Acad. **25**: 127. 1890.

Plains and dry hillsides of the Covillea and artemsia belts. Wyoming to New Mexico, Nevada, and Washington.

2. Strepthanthus tortuosus Kellogg, Proc. Calif. Acad. **2**: 152. *f. 46.* 1863.

Crevices of rocks in canyons and foothills, upward to 2,400 meters; Sierra Nevada. California and western Nevada.

3. Streptanthus cordatus Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 77. 1838.

Plains, foothills, and canyons of the artemisia and pinyon belts. Wyoming and Colorado, westward to the Sierra Nevada.

4. Streptanthus crassifolius Greene, Pittonia **3**: 227. 1897.

Dry hillsides of the artemisia belt. Southern California to Utah and Arizona.

5. Streptanthus wyomingensis A. Nels. Bull. Torrey Club **26**: 126. 1899.

Plains and dry slopes of the artemisia belt. Wyoming and Utah.

6. SUBULARIA L.

1. Subularia aquatica L. Sp. Pl. 642. 1753.

Ponds and lakes of the spruce belt. Newfoundland to British Columbia, southward to New England, Wyoming, northern Nevada, and California.

7. LEPIDIUM L. Peppergrass

Style obsolete.

Upper leaves perfoliate, ovate, acute, 2 to 5 cm. long, the basal 10 cm. long, dissected. Petals yellow ---------- **20. L. perfoliatum.**

Upper leaves not perfoliate.
Pods glabrous or nearly so.
Petals minute or wanting. Lower leaves toothed or pinnatifid, oblanceolate, the upper linear; plants puberulent, simple or branching from the base----------12. L. densiflorum.
Petals equaling or exceeding the sepals.
Stems glabrous or nearly so; basal leaves toothed. Petals exceeding the sepals----------13. L. texanum.
Stems puberulent or glandular; basal leaves oblanceolate, toothed or pinnatifid.
Stem leaves linear to oblanceolate, the upper entire; pods narrowly winged at apex; plants 10 to 20 cm. high, glandular-puberulent. 14. L. ramosum.
Stem leaves oblanceolate, sharp-toothed or incised; pods broad-winged at apex; plants 20 to 60 cm. high, puberulent. 15. L. virginicum.
Pods puberulent.
Pods strongly reticulate, broad-winged at apex. Leaves mostly linear, the basal pinnatifid; annual, 3 to 10 cm. high----19. L. dictyotum.
Pods not reticulate or only faintly so.
Pods deeply emarginate, winged near apex, the wings broad. Petals exceeding the sepals; basal leaves pinnate, the cauline linear-oblanceolate, entire or few-toothed----------17. L. georginum.
Pods emarginate, the wings narrow.
Stems hirsute to nearly glabrous; lower leaves pinnatifid, the segments broad, the upper commonly linear--16. L. lasiocarpum.
Stems puberulent; leaves spatulate to linear, the broader ones cut-toothed----------18. L. pubicarpum.
Style evident.
Plant about 2 cm. high, cespitose, perennial. Leaves spatulate, 3-lobed, clustered, very small; pod ovate, scarcely emarginate-------2. L. nanum.
Plants 5 to 40 cm. high or more, not cespitose.
Stem leaves auriculate, ovate-elliptic, irregularly toothed, 4 to 6 cm. long.
Pods not notched at apex----------1. L. draba.
Stem leaves smaller and narrower, not auriculate, entire, toothed, or pinnatifid.
Pods more or less distinctly winged, suborbicular, 5 to 8 mm. long.
Stem leaves linear, entire or with 1 pair of pinnae; shrubby, 1 meter high or less----------7. L. fremontii.
Pods wingless or merely winged near apex.
Flowers yellow. Pods reticulate, broad-notched; stem leaves oblanceolate, 1 cm. long or more, entire or toothed; annual, branching from the base----------3. L. flavum.
Flowers white or nearly so.
Leaves never pinnatifid. Petals exceeding the sepals; pods glabrous, minutely notched.
Root leaves long-petioled, the blades elliptic, crenate-serrate; stem leaves lanceolate, entire----------5. L. crenatum.
Root leaves on short petioles, entire; stem leaves linear. Stems numerous from a thick deep root------11. L. integrifolium.
Leaves partly pinnatifid.
Segments of basal leaves short and broad, the upper leaves linear or with linear lobes; petals exceeding the sepals.

Style slightly exceeding the winged apex; stems numerous, from a thick root----------8. L. montanum.
Style 0.5 mm. long or more, much exceeding the narrowly winged apex; plants suffruticose----------10. L. scopulorum.
Segments of the leaves elongate; petals exceeding the sepals.
Plants 40 to 80 cm. high, nearly glabrous. Upper leaves linear-oblanceolate; pods ovate, the style much exceeding the winged apex----------6. L. eastwoodiae.
Plants rarely over 30 cm. high.
Plants glabrous, green; upper leaves linear, entire or with 1 pair of pinnae; pods rhombic-ovate; style barely exceeding the winged apex----------9. L. jonesii.
Plants pubescent, grayish, 15 cm. high or less; upper leaves linear, entire; style 0.5 to 1 mm. long---4. L. albiflorum.

1. Lepidium draba L. Sp. Pl. 645. 1753.

Waste places and along railroads; introduced from Europe. New York to Florida, westward to California; also in Europe and Asia.

Lepidium campestre (L.) R. Br., distinguished by its broadly ovate pods with broad apical wings, has been collected in La Sal National Forest, Utah.

2. Lepidium nanum S. Wats. in King, Geol. Expl. 40th Par. 5: 30. *pl. 4, f. 5–7.* 1871.

Dry, gravelly hillsides of the pinyon belt. Nevada.

3. Lepidium flavum Torr. U. S. Rep. Expl. Miss. Pacif. 4: 67. 1857.

Mesas of the Covillea belt. Nevada and California.

4. Lepidium albiflorum Nels. & Kennedy, Muhlenbergia 3: 138. 1908.

Saline meadows of the artemisia belt. Western Nevada.

5. Lepidium crenatum (Greene) Rydb. Bull. Torrey Club 33: 141. 1906.
Thelypodium crenatum Greene, Pittonia 4: 20. 1899.

River valleys and artemisia plains. Southern Colorado and Utah (?).

6. Lepidium eastwoodiae Wooton, Bull. Torrey Club 25: 258. 1898.

Open slopes of the pinyon and aspen belts. New Mexico, southern Colorado, and eastern Utah.

7. Lepidium fremontii S. Wats. in King, Geol. Expl. 40th Par. 5: 30. *pl. 4, f. 3–4.* 1871.

Mesas and slopes of the Covillea and artemisia belts. Nevada, southwestern Utah, Arizona, and southern California.

8. Lepidium montanum Nutt.; Torr. & Gray, Fl. N. Amer. 1: 116. 1838.

Artemisia plains and mountain sides, upward to the spruce belt. Colorado to Arizona, Wyoming, and Washington.

9. Lepidium jonesii Rydb. Bull. Torrey Club 29: 233. 1902.
Lepidium montanum alyssoides Jones, Zoe 4: 266. 1893.

Plains and dry sunny slopes of the artemisia and pinyon belts. Utah and Nevada.

10. Lepidium scopulorum Jones, Proc. Calif. Acad. II. 5: 625. 1895.

Valleys, canyons, and mountain sides, upward to the spruce belt. Utah and Nevada.

11. Lepidium integrifolium Nutt.; Torr. & Gray, Fl. N. Amer. 1: 116. 1838.

Valleys and foothills of the artemisia and pinyon belts. Utah to Wyoming and Washington.

12. Lepidium densiflorum Schrad. "Ind. Sem. Goett. 4. 1832."

Lepidium ramosissimum A. Nels. Bull. Torrey Club **26**: 124. 1899.

Plains of the artemisia belt. Hudson Bay to British Columbia, southward to New York and New Mexico.

13. Lepidium texanum Buckl. Proc. Acad. Phila. **1861**: 449. 1862.

Lepidium intermedium A. Gray, Pl. Wright. **2**: 15. 1853. Not *L. intermedium* A. Rich. 1847.

Plains and dry hillsides of the Covillea and artemisia belts. Missouri to Texas, California, and British Columbia.

14. Lepidium ramosum A. Nels. Bull. Torrey Club **26**: 125. 1899.

Artemisia plains and mountain sides, upward to the spruce belt. South Dakota to Colorado and Utah.

15. Lepidium virginicum L. Sp. Pl. 645. 1753.

Fields and waste places; Utah. Quebec to Florida, Utah, Texas, and Mexico.

16. Lepidium lasiocarpum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 115. 1838.

Mesas and dry hillsides of the Covillea and artemisia belts. Washington to California and Texas.

17. Lepidium georginum Rydb. Bull. Torrey Club **30**: 253. 1903.

In the Covillea and lower artemisia belts. Southwestern Utah, Nevada, and Arizona.

18. Lepidium pubicarpum A. Nels. Bot. Gaz. **30**: 189. 1900.

Plains and hillsides of the artemisia belt. Wyoming, Utah, and Nevada.

19. Lepidium dictyotum A. Gray, Proc. Amer. Acad. **7**: 329. 1868.

Alkaline meadows. Washington to California and Nevada.

20. Lepidium perfoliatum L. Sp. Pl. 643. 1753.

About settlements; introduced from Europe.

8. THLASPI L. PENNYCRESS

Pod nearly orbicular, 1 cm. long, broad-winged, deeply notched at the apex. Plants 15 cm. high or more, glabrous; leaves oblong, dentate—**1. T. arvense.**

Pods cuneate or cuneate-oblanceolate, narrowly winged. Petals 4 to 7 mm. long, white or purplish.

Pod acutish, cuneate, 5 to 7 mm. long. Basal leaves obovate to oblanceolate, the cauline elliptic to oblong, clasping; plant glabrous, 10 to 15 cm, high—**2. T. californicum.**

Pods rounded, truncate, or emarginate.

Pod emarginate, with narrow sinus; basal leaves elliptic to oblong, the cauline ovate, auriculate—**3. T. coloradense.**

Pod truncate or nearly so, the sinus very broad; basal leaves oval or obovate, the cauline ovate-oblong, cordate, clasping—**4. T. glaucum.**

1. Thlaspi arvense L. Sp. Pl. 646. 1753.

Waste places; introduced from Europe. Labrador to British Columbia, southward to Florida and Utah.

2. Thlaspi californicum S. Wats. Proc. Amer. Acad. **17**: 365. 1882.

Meadows and mountain sides of the aspen and spruce belts. California and western Nevada (?).

3. Thlaspi coloradense Rydb. Bull. Torrey Club **28**: 280. 1901.

Spruce and alpine belts. Colorado, Utah, and New Mexico.

4. Thlaspi glaucum A. Nels. Bull. Torrey Club **25**: 275. 1898.

Aspen, spruce, and alpine belts. Montana to Colorado, Nevada, and Idaho.

9. ERYSIMUM L. HEDGEMUSTARD

1. Erysimum officinale L. Sp. Pl. 660. 1753.
Waste places; introduced from Europe. Maine to California.

10. NORTA Adans. TUMBLEMUSTARD

1. Norta altissima (L.) Britton in Britt. & Brown, Illustr. Fl. 2: 174. 1913.
Sisymbrium altissimum L. Sp. Pl. 659. 1753.
Waste places; introduced from Europe.

11. ISATIS L. WOAD

1. Isatis tinctoria L. Sp. Pl. 670. 1753.
Waste places; Utah. Introduced from Europe.

12. ERUCA Mill. SALAD-ROCKET

1. Eruca sativa Mill. Gard. Dict. ed. 8. *Eruca* no. 1. 1768.
Brassica eruca L. Sp. Pl. 777. 1753.
Waste places; introduced from Europe.

13. SINAPIS L.

Pod densely hirsute, 3 cm. long, the beak equaling the body; petals about 10 mm. long; leaves lyrate-pinnatifid ..... 1. S. alba.
Pod glabrous or nearly so, 3 to 4 cm. long, the beak 5 to 10 mm. long; petals about 8 mm. long; leaves dentate or lobed ..... 2. S. arvensis.

1. Sinapis alba L. Sp. Pl. 668. 1753. WHITE MUSTARD.
Waste places and fields; introduced from Europe. Maine to Florida, westward to British Columbia and California.

2. Sinapis arvensis L. Sp. Pl. 668. 1753. CHARLOCK.
Waste places and fields; introduced from Europe. Maine to the West Indies, westward to British Columbia and California.

14. BRASSICA L.

Upper leaves clasping, lanceolate, the basal lyrate-pinnatifid; petals cream-colored; pod 5 to 7 cm. long, the beak 1 cm. long or more .. 1. B. campestris.
None of the leaves clasping, the lower pinnatifid, with a large rounded terminal lobe; petals yellow; pods more or less torulose.
Pod ascending, terete or angled, 5 cm. long or less, the beak 5 to 8 mm. long ..... 2. B. juncea.
Pod appressed, angled, 1.5 to 2 cm. long, the beak 3 to 4 mm. long. 3. B. nigra.

1. Brassica campestris L. Sp. Pl. 666. 1753. RUTABAGA.
Waste places and fields; introduced from Europe. Atlantic States to Utah and Nevada.

2. Brassica juncea (L.) Coss. Bull Soc. Bot. France 6: 609. 1859.
Sinapis juncea L. Sp. Pl. 668. 1753.
Fields and waste places; introduced from Asia. Nova Scotia to Saskatchewan, southward to Virginia and New Mexico.

3. Brassica nigra (L.) Koch in Roehl. Deutschl. Fl. ed. 3. 4: 713. 1833. BLACK MUSTARD.
Sinapis nigra L. Sp. Pl. 668. 1753.
Fields and waste places; introduced from Europe. Maine to the West Indies, westward to British Columbia and California.

15. RAPHANUS L. Radish

Pod 2 or 3-seeded, 4 to 5 cm. long, the beak exceeding the body; petals mostly pale purple ---------- 1. R. sativus.
Pod 2 to 8-seeded, moniliform, the beak commonly shorter than the body; petals white, yellowish, or purplish ---------- 2. R. raphanistrum.

1. Raphanus sativus L. Sp. Pl. 669. 1753. Radish.

Waste places about settlements; introduced from Europe. Quebec to the West Indies, westward to British Columbia and California.

2. Raphanus raphanistrum L. Sp. Pl. 669. 1753.

Established north and west of the Great Basin; introduced from Europe.

16. CAMPE Dulac. Wintercress

Leaves with 4 to 8 pairs of elliptic or rounded lobes; pod 5 to 6 cm. long, sharp-angled ---------- 1. C. verna.
Leaves with 1 to 4 pairs of lobes; pods obtusely angled, 2 to 4.5 cm. long.
Lobes of basal leaves 1 to 2 pairs, small; pod slender, ascending. 2. C. americana.
Lobes of basal leaves 3 to 4 pairs; pod stout, more or less appressed. 3. C. stricta.

1. Campe verna (Mill.) Heller, Muhlenbergia 7: 124. 1912.

Erysimum vernum Mill. Gard. Dict. ed. 8. *Erysimum* no. 3. 1768.

Waste places; introduced from Europe. New York to Florida, Colorado, and California.

2. Campe americana (Rydb.) Cockerell; Daniels, Fl. Boulder, Colo. 131. 1911.

Barbarea americana Rydb. Mem. N. Y. Bot. Gard. 1: 174. 1900.

Artemisia plains to the spruce belt. Montana to Colorado, Utah, and British Columbia.

3. Campe stricta (Andrzej.) W. F. Wight; Piper, Contr. U. S. Nat. Herb. 11: 303. 1906.

Barbarea stricta Andrzej. in Besser, Enum. Pl. 72. 1822.

Waste places, Virginia City; introduced from Europe. Quebec to Florida, westward to Washington and California.

17. SISYMBRIUM L. Watercress

1, Sisymbrium nasturtium-aquaticum L. Sp. Pl. 657. 1753.

Radicula nasturtium-aquaticum Britten & Rendle, Journ. Bot. Brit. & For. 14: 99. 1907.

Wet places and about springs and running water; introduced from Europe. Throughout most of temperate North America; Europe.

18. RADICULA Hill

Stems more or less hispid, 0.3 to 1 meter high or more. Leaves lyrate-pinnatifid, the lobes ovate, toothed; pods 4 to 6 mm. long, glabrous. 2. R. hispida.
Stems glabrous or nearly so.
Pods globose or nearly so, 2 to 3 mm. long. Leaves sinuate or lyrately lobed; plants diffuse, 10 to 30 cm. high ---------- 4. R. sphaerocarpa.
Pods elliptic to oblong or linear.
Style 2 to 3 mm. long. Pods 10 to 15 mm. long; stems 10 to 40 cm. high; leaves pinnately cleft ---------- 1. R. sinuata.

Styles 1 mm. long or less.
Plants with erect stems, 20 to 80 cm. high.
Leaves lyrate-pinnatifid, the segments oblong or lanceolate, toothed; petals 2 mm. long; pods 5 to 8 mm. long_____3. **R. terrestris.**
Leaves entire or merely sinuate; petals 1 mm. long; pods tapering upward, 6 mm. long or more_____10. **R. integra.**
Plants low, diffusely branched.
Petals about 2 mm. long. Leaves laciniately toothed or pinnatifid, the lobes obtuse.
Pod about 5 mm. long_____5. **R. alpina.**
Pod 8 to 12 mm. long, linear, curved_____8. **R. curvisiliqua.**
Petals about 1 mm. long.
Pods linear, 6 to 15 mm. long. Leaves pinnatifid, the lobes toothed. 9. **R. lyrata.**
Pods elliptic or oblong, 5 to 7 mm. long.
Leaves sinuate to pinnatifid, with acute lobes; pods 5 mm. long, on recurved pedicels_____7. **R. curvipes.**
Leaves sinuate-lobed to lyrate-pinnatifid, with obtuse lobes; pods 5 to 7 mm. long_____6. **R. obtusa.**

1. Radicula sinuata (Nutt.) Greene, Leaflets **1**: 113. 1905.
Nasturtium sinuatum Nutt.; Torr. & Gray. Fl. N. Amer. **1**: 73. 1838.
Wet places of the artemisia belt. Saskatchewan to Arkansas, westward to Washington and Arizona.

2. Radicula hispida (Desv.) Heller, Muhlenbergia **7**: 123. 1912.
Brachylobus hispidus Desv. Journ. de Bot. **3**: 183. 1814.
In water and wet places on plains, upward to the aspen belt. New Brunswick to Alaska, southward to Florida and Utah.

3. Radicula terrestris (R. Br.) Woot. & Standl. Contr. U. S. Nat. Herb. **19**: 284. 1915.
Nasturtium terrestre R. Br. in Ait. f. Hort. Kew. ed. 2. **4**: 110. 1812.
In water and wet places on plains, upward to the aspen belt. Labrador to Georgia, westward to Alaska and California; also in Europe and Asia.

4. Radicula sphaerocarpa (A. Gray) Greene, Leaflets **1**: 113. 1905.
Nasturtium sphaerocarpum A. Gray, Mem. Amer. Acad. n. ser. **4**: 6. 1849.
Wet meadows on plains and plateaus and in canyons, upward to the spruce belt; northern Arizona. Illinois to Texas, westward to California.

5. Radicula alpina (S. Wats.) Greene, Leaflets **1**: 114. 1905.
Nasturtium obtusum alpinum S. Wats. in King, Geol. Expl. 40th Par. **5**: 15. 1871.
Spruce and alpine belts. Montana to Colorado, Utah, and Idaho.

6. Radicula obtusa (Nutt.) Greene, Leaflets **1**: 113. 1905.
Nasturtium obtusum Nutt. Torr. & Gray, Fl. N. Amer. **1**: 74. 1838.
Wet places on plains and in canyons, upward to the aspen belt. Michigan to Washington, southward to Texas and California.

7. Radicula curvipes Greene, Leaflets **1**: 113. 1905.
Roripa curvipes Greene, Pittonia **3**: 97. 1896.
Aspen and spruce belts. Wyoming to New Mexico and Utah.

8. Radicula curvisiliqua (Hook.) Greene, Leaflets **1**: 113. 1905.
Sisymbrium curvisiliquum Hook. Fl. Bor. Amer. **1**: 61. 1830.
Wet places of the artemisia belt, upward to 2,100 meters. Montana to Wyoming, westward to British Columbia and California.

9. Radicula lyrata (Nutt.) Greene, Leaflets 1: 113. 1905.
Nasturtium lyratum Nutt.; Torr. & Gray, Fl. N. Amer. 1: 73. 1838.
Wet places of the artemisia belt and in canyons to the spruce belt. Montana to Colorado, westward to Washington and California.

10. Radicula integra (Rydb.) Heller, Muhlenbergia 7: 124. 1912.
Roripa integra Rydb. Bull. Torrey Club 29: 236. 1902.
Aspen and spruce belts. Utah.

19. CARDAMINE L. Bittercress

Leaves entire or sinuate-toothed. Plants 30 to 60 cm. high; petals white, 8 mm. long or more.
Stem and leaves more or less hairy or pilose, the latter reniform to round-cordate, 3 to 4 cm. broad; petals spatulate; pod 2.5 cm. long or more. **2. C. infausta.**
Stem and leaves glabrous; petals obcordate or obovate; pods 2 to 3 cm. long.
Leaves cordate to ovate or oblong-ovate, acute, repand or coarsely crenate, longer than broad ---- **1. C. cordifolia.**
Leaves reniform to cordate, mostly obtuse, sinuate, broader than long. **3. C. lyallii.**
Leaves (at least some) pinnate or lobed.
Petals 5 to 6 mm. long, obcordate; pods 2 to 3.5 cm. long, over 1 mm. wide.
Plants 30 to 60 cm. high with simple, cordate-ovate or 3 to 5-foliolate leaves ---- **4. C. breweri.**
Petals 2 to 3 mm. long; pods 2 to 3 cm. long, 1 mm. wide or less; leaflets 5 to 17, oblong, ovate or obovate.
Stem glabrous or nearly so, 20 to 80 cm. high ---- **5. C. pennsylvanica.**
Stem more or less hirsute below, about 20 cm. high ---- **6. C. multifolia.**

1. Cardamine cordifolia A. Gray, Mem. Amer. Acad. n. ser. 4: 8. 1849.
Wet places in canyons and on plateaus of the aspen and spruce belts. Wyoming and Idaho to New Mexico and Arizona.

2. Cardamine infausta Greene, Pittonia 4: 307. 1901.
Aspen and spruce belts. Colorado and Utah.

3. Cardamine lyallii S. Wats. Proc. Amer. Acad. 22: 466. 1887.
Wet places of the aspen and spruce belts. Washington to California and Nevada.

4. Cardamine breweri S. Wats. Proc. Amer. Acad. 10: 339. 1875.
Cardamine orbicularis Greene, Pittonia 4: 202. 1901.
In moist places of the aspen and spruce belts. Montana to Wyoming, Washington, and British Columbia.

5. Cardamine pennsylvanica Muhl.; Willd. Sp. Pl. 3: 486. 1800.
Wet places on the plains, upward to the spruce belt. Newfoundland to Florida, Oregon, and British Columbia.

6. Cardamine multifolia Rydb. Bull. Torrey Club 29: 238. 1902.
Wet places on the plains, upward to the spruce belt. Montana to British Columbia and Utah.

20. IDAHOA Nels. & Macbr. Flatpod

1. Idahoa scapigera (Hook.) Nels. & Macbr. Bot. Gaz. 56: 474. 1913.
Platyspermum scapigerum Hook. Fl. Bor. Amer. 1: 68. *pl. 18, B.* 1838.
Artemisia plains and dry hillsides. Washington and Idaho to Nevada and California.

21. DITHYREA Harv. Spectacle-pod

Leaves ovate-lanceolate to linear-oblong, entire or with few teeth, grayish; pods notched below, the cells 5 to 6 mm. in diameter_____1. **D. wislizeni.**
Leaves orbicular to ovate, coarsely few-toothed, pubescent; pods notched above and below, the cells about 6 mm. in diameter____2. **D. californica.**

1. Dithyrea wislizeni Engelm. in Wisliz. Mem. North. Mex. 96. 1848.

Plains and dry hillsides of the artemisia belt. Colorado and southern Utah to Texas and Mexico.

2. Dithyrea californica Harv. in Hook. Lond. Journ. Bot. 4: 77. *pl. 5.* 1845.

Plains and dry canyons of the Covillea belt. Southern Nevada, Arizona, and southern California.

22. PHYSARIA A. Gray. Twinpod

Pods constricted above and below, the walls thin, not keeled; petals spatulate_____1. **P. didymocarpa.**
Pods constricted above, rounded or slightly cordate at base, the walls firm, keeled; petals oblanceolate_____2. **P. newberryi.**

1. Physaria didymocarpa (Hook.) A. Gray, Gen. Ill. 1: 162. 1848.

Vesicaria didymocarpa Hook. Fl. Bor. Amer. 1: 49. *pl. 16.* 1830.

Pinyon, yellow pine, and aspen belts. Saskatchewan and Alberta to Colorado and Nevada.

2. Physaria newberryi A. Gray in Ives, Rep. Colo. Riv. 6. 1860.

Plains and dry hillsides of the Covillea and artemisia belts. New Mexico, southern Utah, Arizona, and Nevada.

23. LESQUERELLA S. Wats. Bladderpod

Plants annual, 10 to 30 cm. high, with few to numerous stems; pods globose, glabrous, 4 mm. long. Leaves linear to oblanceolate, entire or few-toothed; petals 6 to 7 mm. long_____8. **L. gordoni.**
Plants perennial; pods pubescent.
  Pods globose, 3 to 4 mm. long. Style 4 to 5 mm. long; basal leaves obovate or oval, the cauline oblanceolate; plants cespitose, 5 to 15 cm. high. **7. L. utahensis.**
  Pods elliptic to ovate.
    Basal leaves linear to linear-oblanceolate.
      Style 2 mm. long. Pods 4 mm. long; petals with broad-winged claws; dwarf plants with few stem leaves_____4. **L. arizonica.**
      Styles 4 mm. long or more.
        Petals about 10 mm. long; pods ovate-elliptic, not perceptibly compressed above_____2. **L. intermedia.**
        Petals about 6 mm. long; pods ovate-oblong, compressed above. **3. L. alpina.**
    Basal leaves broader, oblanceolate to round-ovate.
      Style 2 to 3 mm. long, shorter than the pod. Basal leaves round-ovate, the cauline oblanceolate_____1. **L. kingii.**
      Style 4 mm. long or more, nearly equaling or longer than the pod.
        Stem leaves 1 to 2 cm. long, oblanceolate; pod ellipsoid, 7 to 10 mm. long, the style slightly shorter; petals 10 mm. long. **5. L. montana.**
        Stem leaves obovate to oblanceolate, mostly less than 1 cm. long; pod 6 mm. long, the style shorter; petals about 6 mm. long. **6. L. wardii.**

1. **Lesquerella kingii** S. Wats. Proc. Amer. Acad. **23**: 251. 1888.
Vesicaria kingii S. Wats. Proc. Amer. Acad. **20**: 353. 1885.
Rocky canyons and mountain sides of the aspen and spruce belts. Utah and Nevada.

2. **Lesquerella intermedia** (S. Wats.) Heller, Pl. World 1: 22. 1897.
Lesquerella alpina intermedia S. Wats. Proc. Amer. Acad. **23**: 251. 1888.
Foothills and canyons upward to the aspen belt. New Mexico, Arizona, southern Utah, and Colorado.

3. **Lesquerella alpina** (Nutt.) S. Wats. Proc. Amer. Acad. **23**: 251. 1888.
Vesicaria alpina Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 102. 1838.
Plains and dry hillsides. North Dakota and Montana to Colorado and Utah.

4. **Lesquerella arizonica** S. Wats. Proc. Amer. Acad. **23**: 251, 254. 1888.
Hillsides and canyons; Kaibab Plateau. Arizona and southern Utah.

5. **Lesquerella montana** (A. Gray) S. Wats. Proc. Amer. Acad. **23**: 251. 1888.
Vesicaria montana A. Gray, Proc. Acad. Phila. **1863**: 58. 1863.
Aspen and spruce belts. Wyoming, Utah, and New Mexico.

6. **Lesquerella wardii** S. Wats. Proc. Amer. Acad. **23**: 252, 255. 1888.
Spruce and alpine belts. Utah.

7. **Lesquerella utahensis** Rydb. Torrey Club **30**: 252. 1903.
Aspen, spruce, and alpine belts. Utah and Nevada.

8. **Lesquerella gordoni** (A. Gray) S. Wats. Proc. Amer. Acad. **23**: 253. 1888.
Vesicaria gordoni A. Gray, Bost. Journ. Nat. Hist. **6**: 149. 1850.
Plains and dry hillsides of the Covillea belt. Western Texas to southern Nevada.

24. HUTCHINSIA R. Br.

1. **Hutchinsia procumbens** (L.) DC. Journ. de Bot. Desv. **3**: 168. 1814.
Lepidium procumbens L. Sp. Pl. 643. 1753.
Alkaline flats and in valleys of the artemisia and pinyon belts. Labrador to British Columbia, southward to Colorado and California.

25. BURSA Weber. SHEPHERDS-PURSE

1. **Bursa bursa-pastoris** (L.) Britton, Mem. Torrey Club **5**: 172. 1894.
Thlaspi bursa-pastoris L. Sp. Pl. 647. 1753.
About settlements, along sheep trails, and on grazing areas; introduced from Europe. Labrador to British Columbia, southward to Florida and California.

26. CAMELINA Crantz. FALSE-FLAX

Stems glabrous; petals 5 to 6 mm. long; pods 6 to 8 mm. long ..... **1. C. sativa.**
Stems pubescent; petals about 4 mm. long; pods 4 to 6 mm. long. **2. C. microcarpa.**

1. **Camelina sativa** Crantz, Stirp. Austr. **1**: 18. 1769.
About settlements; introduced from Europe; Idaho. Nova Scotia to New York, westward to California.

2. **Camelina microcarpa** Andrzej. in DC. Reg. Veg. Syst. **2**: 517. 1821.
About settlements; introduced from Europe. Rhode Island to Virginia, westward to California.

27. NESLIA Desv. Ballmustard

1. Neslia paniculata (L.) Desv. Journ. de Bot. Desv. 3: 162. 1814.
Myagrum paniculatum L. Sp. Pl. 641. 1753.

Along railroads and in waste places, north of the Great Basin; introduced from Europe. Quebec to Indiana, South Dakota, and Washington.

28. DRABA L. Whitlowgrass

Plants winter annuals.
- Style present, slender. Pod 5 mm. long or more; petals yellow; plants scapose, 5 to 10 cm. high, hirsute; leaves oblanceolate, 1 to 3 cm. long. **1. D. asprella.**
- Style obsolete.
  - Pods glabrous.
    - Petals 2-fid, small, white. Plants scapose, 5 to 15 cm. high, with oblong to oblanceolate, pubescent leaves **2. D. verna.**
    - Petals entire or at the most emarginate, yellow (turning white).
      - Stems scapose, glabrous; leaves narrowly oblanceolate; pods straight, 6 to 10 mm. long **9. D. crassifolia.**
      - Stems commonly leafy, more or less hirsute below; leaves spatulate to oblanceolate; pods somewhat falcate, 8 to 15 mm. long. **8. D. nitida.**
  - Pods hairy.
    - Pods elliptic-oblong, 7 mm. long or less, about 3 mm. broad. Plants mostly stellate-pubescent; leaves obovate to oblanceolate, mostly toothed **5. D. sonorae.**
    - Pods oblong, at least 3 times longer than broad.
      - Plants stellate-pubescent; leaves basal or on the lower part of the stem; flowers white.
        - Pods in a more or less elongated raceme; leaves obovate or cuneate, mostly toothed, 1 to 4 cm. long **4. D. cuneifolia.**
        - Pods mostly in short dense racemes; leaves ovate or elliptic, 5 to 15 mm. long **3. D. micrantha.**
      - Plants more or less hirsute with simple or branched hairs; leaves more or less scattered on the stem; flowers yellow (often turning white).
        - Pedicels shorter than the (6 to 10 mm. long) pod **7. D. montana.**
        - Pedicels 10 to 20 mm. long, much exceeding the pod **6. D. nemorosa.**

Plants perennial.
- Plants with more or less scattered leaves.
  - Petals white; plants densely stellate-pubescent.
    - Plant dwarf, alpine; leaves crowded, oblong; pods oblong, 4 to 6 mm. long; style obsolete **29. D. breweri.**
    - Plant 10 to 20 cm. high, cespitose; leaves lanceolate to ovate, about 1 cm. long; pods 6 to 8 mm. long; style evident **22. D. cana.**
  - Petals yellow; plants more or less long-hairy or stellate-pubescent.
    - Plants hirsute, densely cespitose, the hairs simple or branched. Petals 5 to 6 mm. long; pods about 1 cm. long, twisted; style evident. **23. D. streptocarpa.**
    - Plants stellate-pubescent or with simple hairs.
      - Pods glabrous or slightly puberulent; style 1.5 to 2 mm. long. Plants 15 to 40 cm. high, cespitose; leaves ovate to oblanceolate, more or less denticulate or entire.
        - Pods twisted, about 10 mm. long **25. D. helleriana.**
        - Pods not twisted, 8 to 10 mm. long **24. D. spectabilis.**

Pods densely pubescent; style 1 mm. long or obsolete.
Stems decumbent, 15 cm. high or less; style obsolete. Leaves 1 to 2 cm. long, oblanceolate or spatulate; pods 8 to 10 mm. long, not twisted----------30. D. brachystylis.
Stems erect or nearly so; style 1 mm. long.
Leaves thick, 1 to 2 cm. long, oblanceolate to oblong. Petals 4 to 6 mm. long; pods 10 to 12 mm. long, pubescent, twisted.
28. D. aurea.
Leaves thin. Pods 10 to 18 mm. long, stellate-pubescent; petals pale yellow.
Petals 5 to 6 mm. long; basal leaves entire or nearly so.
26. D. luteola.
Petals 3 to 4 mm. long; basal leaves entire.
27. D. aureiformis.
Plants scapose or nearly so, more or less densely cespitose.
Leaves merely ciliate, sparingly pubescent or glabrous. Plants low.
Style none or inconspicuous. Pods glabrous, oblong, 4 to 5 mm. long; petals white----------20. D. fladnizensis.
Style evident, 0.5 mm. long or more.
Leaves obovate to oblanceolate, 1 cm. long or less. Pods ovate-lanceolate, 6 mm. long or more, mostly glabrous----------11. D. lemmoni.
Leaves linear.
Pods pubescent, ovate-elliptic, 4 to 5 mm. long--16. D. douglasii.
Pods glabrous, flat.
Leaves acute; petals yellow; pod ovate, 3 to 4 mm. long.
15. D. pectinata.
Leaves obtuse; petals white; pods 8 to 10 mm. long, narrowly elliptic----------21. D. oreibata.
Leaves with branching or stellate hairs.
Pods pubescent.
Flowers white. Style short, thick; pods ovate-elliptic, 4 mm. long; plants dwarf, densely cespitose; leaves oblong, obtuse.
19. D. subsessilis.
Flowers yellow.
Leaves linear or nearly so, 5 to 10 mm. long; pods ovate, 4 mm. long----------13. D. oligosperma.
Leaves obovate to oblanceolate, 10 mm. long or less; pods ovate to oblong-lanceolate, 4 to 8 mm. long----------12. D. ventosa.
Pods glabrous.
Flowers white.
Leaves linear or nearly so----------13. D. oligosperma.
Leaves broadly spatulate to obovate.
Pods broadly ovate, 3 to 4 mm. long; plants 2 to 3 cm. high, with thick obovate leaves 3 to 4 mm. long.
14. D. uncialis.
Pods oblong to linear, 6 to 8 mm. long; leaves oblanceolate, acutish ----------17. D. nivalis.
Flowers yellow.
Pods 16 to 20 mm. long, oblong-ovate, acute. Style 2 mm. long; leaves oblanceolate, 18 to 25 mm. long, stellate-pubescent.
10. D. eurycarpa.
Pods 3 to 10 mm. long.
Leaves obovate to oblanceolate, 6 to 10 mm. long, mostly obtuse.
Pods ovate-oblanceolate, 6 mm. long or less--11. D. lemmoni.

Leaves linear to narrowly spatulate.
Pods globose; leaves 3 to 5 mm. long, narrowly spatulate. **18. D. sphaeroides.**
Pods ovate, flattened; leaves linear or nearly so, 5 to 10 mm. long **13. D. oligosperma.**

1. Draba asprella Greene, Bull. Torrey Club **10**: 125. 1883.
Along watercourses in the yellow pine belt. Southern Utah and Arizona.

2. Draba verna L. Sp. Pl. 642. 1753.
About settlements; introduced from Europe. Washington to California; also throughout eastern and central United States.

3. Draba micrantha Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 109. 1838.
Plains and rocky hillsides of the artemisia belt. Illinois to Texas, westward to Washington and Arizona.

4. Draba cuneifolia Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 198. 1838.
Plains and grassy hillsides of the Covillea and artemisia belts. Illinois to Florida, Utah, and California.

5. Draba sonorae Greene, Bull. Calif. Acad. **2**: 59. 1886.
Mesas and rocky canyons of the Covillea belt. Southern Nevada, Arizona, and southern California.

6. Draba nemorosa L. Sp. Pl. 643. 1753.
Artemisia plains, canyons, and mountain sides, upward to the spruce belt. Michigan to Colorado, Nevada, and British Columbia; also in Europe and Asia.

7. Draba montana S. Wats. Proc. Amer. Acad. **14**: 289. 1879.
Aspen and spruce belts. Colorado, Utah(?), and New Mexico.

8. Draba nitida Greene, Pl. Baker. **3**: 7. 1901.
Aspen, spruce, and alpine belts. Alberta and British Columbia, southward to Colorado and California.

9. Draba crassifolia Graham, Edinburgh New Phil. Journ. **1829**: 182. 1829.
Spruce and alpine belts. Greenland to Alaska, southward to Colorado and Utah.

10. Draba eurycarpa A. Gray, Proc. Amer. Acad. **6**: 520. 1865.
Spruce and alpine belts. California to Nevada and Idaho.

11. Draba lemmoni S. Wats. Bot. Calif. **2**: 430. 1880.
Spruce and alpine belts. California, Oregon, and western Nevada.

12. Draba ventosa A. Gray, Amer. Nat. **8**: 212. 1874.
Draba sobolifera Rydb. Bull. Torrey Club **30**: 251. 1903.
Spruce and alpine belts. Wyoming, Utah, Nevada, and California.

13. Draba oligosperma Hook. Fl. Bor. Amer. **1**: 51. 1830.
Draba andina A. Nels. Bull. Torrey Club **26**: 352. 1899.
Spruce and alpine belts. Alberta to Alaska, southward to Utah and California.

14. Draba uncialis Rydb. Bull. Torrey Club **30**: 251. 1903.
Alpine belt. Utah.

15. Draba pectinata (S. Wats.) Rydb. Bull. Torrey Club. **39**: 327. 1912.
Draba glacialis pectinata S. Wats. Proc. Amer. Acad. **23**: 260. 1888.
Alpine belt. Utah and Nevada.

16. Draba douglasii A. Gray, Proc. Amer. Acad. **7**: 328. 1868.
Spruce and alpine belts. Oregon, California, and Nevada.

17. Draba nivalis Liljebl. Svensk. Vet. Akad. Handl. **1793**: 208. 1793.
Alpine belt; Uintah mountains. Greenland to Alaska, southward to Utah; also in Europe.

18. Draba sphaeroides Payson, Amer. Journ. Bot. **4**: 265. 1917.
Alpine belts. Nevada.

19. Draba subsessilis S. Wats. Proc. Amer. Acad. **23**: 255. 1888.
Alpine belt. California and western Nevada.

20. Draba fladnizensis Wulf. in "Jacq. Misc. **1**: 147. *pl. 17, f. 1.* 1778."
Alpine belt. Greenland to British Columbia, southward to Colorado and Utah.

21. Draba oreibata Macbr. & Payson, Amer. Journ, Bot. **4**: 257. 1917.
Alpine belts. Utah and Idaho.

22. Draba cana Rydb. Bull. Torrey Club **29**: 241. 1902.
Draba valida Goodding, Bot. Gaz. **37**: 55. 1904.
Spruce and alpine belts. Alberta and British Columbia, southward to Utah and New Mexico.

23. Draba streptocarpa A. Gray, Amer. Journ. Sci. II. **33**: 242. 1862.
Spruce and alpine belts. Wyoming to New Mexico and Utah(?).

24. Draba spectabilis Greene, Pittonia **4**: 19. 1899.
Spruce and alpine belts. Wyoming, Colorado, and eastern Utah.

25. Draba helleriana Greene, Pittonia **4**: 17. 1899.
Aspen and spruce belts. Colorado, Utah, New Mexico, and Arizona.

26. Draba luteola Greene, Pittonia **4**: 19. 1899.
Spruce and alpine belts. Colorado and Utah.

27. Draba aureiformis Rydb. Bull. Torrey Club **28**: 278. 1901.
Spruce and alpine belts. South Dakota to Colorado and Utah.

28. Draba aurea Vahl in Hornem. Fors. Dansk. Plantel. ed. 2. 599. 1806.
Spruce and alpine belts. Greenland to British Columbia, southward to Colorado and Arizona.

29. Draba breweri S. Wats. Proc. Amer. Acad. **23**: 260. 1888.
Alpine belt. California and western Nevada.

30. Draba brachystylis Rydb. Bull. Torrey Club **29**: 240. 1902.
Spruce and alpine belts. Utah.

29. ATHYSANUS Greene

1. Athysanus pusillus (Hook.) Greene, Bull. Calif. Acad. **1**: 72. 1885.
Thysanocarpus pusillus Hook. Icon. Pl. **1**: *pl. 42.* 1837.
Plains and dry hillsides of the artemisia belt; southeastern California. British Columbia to Idaho, California, Nevada (?), and Arizona.

30. THYSANOCARPUS Hook.

Pods tomentose, fenestrate, the margin entire or nearly so; plant hirsute below ..... **2. T. elegans**

Pods glabrous or pubescent; plants glabrous or hirsute below.
Pods glabrous, the margin more or less entire or crenately toothed; plant glabrous ---------- 1. T. amplectens.
Pods pubescent or glabrous, the margin crenate; plant hirsute below. 3. T. curvipes.

1. **Thysanocarpus amplectens** Greene, Pittonia 3: 87. 1896.
Covillea, artemisia, and pinyon belts. Southern Utah, Arizona, and New Mexico.

2. **Thysanocarpus elegans** Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 26. 1835.
Plains and dry hillsides of the artemisia and pinyon belts. California to Arizona, and Nevada.

3. **Thysanocarpus curvipes** Hook. Fl. Bor. Amer. 1: 69. *pl. 18, A*. 1830.
Thysanocarpus trichocarpus Rydb. Bull. Torrey Club 30: 253. 1903.
Plains and dry hillsides of the artemisia and pinyon belts. Idaho and Washington to California and Arizona.

31. SMELOWSKIA C. A. Meyer

Leaf segments oblong to linear, obtuse; petals clawed, spatulate, 5 to 6 mm. long; pods 7 to 12 mm. long, tapering to each end; plants 10 to 20 cm. high, cespitose, stellate-pubescent ---------- 1. S. americana.
Leaf segments linear, sharp-pointed; petals clawed, oblong, 4 mm. long; pods tetragonal, 8 to 10 mm. long; plants 10 to 15 cm. high, cespitose, pubescent ---------- 2. S. fremontii.

1. **Smelowskia americana** Rydb. Bull. Torrey Club 29: 239. 1902.
Hutchinsia calycina Hook. Fl. Bor. Amer. 1: 58. *pl. 17, B*. 1830. Not *H. calycina* Desv. 1814.
Spruce and alpine belts. Montana to Alaska, southward to Colorado and California.

2. **Smelowskia fremontii** S. Wats. Proc. Amer. Acad. 11: 123. 1876.
Plains and dry hillsides of the artemisia and pinyon belts. Oregon, California, and Nevada.

32. SOPHIA Adans. TANSYMUSTARD

Stems (at least above) densely glandular-pubescent or viscid, 0.5 to 1 meter high. Leaves bipinnatifid, pubescent; pods 10 mm. long or more; style obsolete ---------- 5. S. viscosa.
Stems glabrous, pubescent, or sparingly glandular.
Style evident, 0.5 mm. long or more. Pedicels equaling or exceeding the pod; plants 30 to 60 cm. high, stellate-pubescent; leaves bipinnatifid, with obtuse lobes.
Pods and pedicels mostly erect, the former linear, 8 to 10 mm. long; plants glabrous or nearly so ---------- 6. S. procera.
Pods and pedicels ascending, the former elliptic, 4 to 8 mm. long; plants stellate-pubescent to glabrous ---------- 8. S. sonnei.
Style obsolete.
Pods 20 mm. long or more, linear. Minutely pubescent annual, 1 meter high or less; leaves tripinnatifid, the segments linear. 1. S. parviflora.

Pods 15 mm. long or less, elliptic, linear, or clavate.
Pods elliptic, 3 to 4 mm. long. Plants 10 to 30 cm. high, branching from base, densely stellate-pubescent; leaves tripinnatifid, the lobes linear. 7. S. paradisa.
Pods 5 to 15 mm. long, clavate or linear.
Pedicels and pods erect or nearly so, the latter 3 to 6 mm. long, acute.
Plants 30 to 40 cm. high, more or less stellate-pubescent, often glandular; leaves tripinnatifid, the lobes obtuse. 9. S. hartwegiana.
Pedicels ascending or spreading, the pods often erect.
Plants cinereous-stellate or pubescent, 30 to 60 cm. high; leaves finely dissected, the segments elliptic to linear-oblong. Pedicels 6 to 10 mm. long or more; pods 8 to 12 mm. long, erect. 2. S. pinnata.
Plants glabrous or sparingly glandular or stellate-pubescent, 30 to 60 cm. high; leaves pinnate to bipinnatifid, the lobes lanceolate, toothed. Pods 10 to 15 mm. long.
Pedicels 4 to 6 mm. long; segments of the upper leaves linear, toothed----------3. S. incisa.
Pedicels 10 to 20 mm. long; segments of the upper leaves linear, entire----------4. S. filipes.

1. Sophia parviflora (Lam.) Standl. Contr. U. S. Nat. Herb. **22**: 347. 1921.
Sisymbrium sophia L. Sp. Pl. 659. 1753.
Sisymbrium parviflorum Lam. Fl. Franc. **2**: 519. 1778.
Waste places and about settlements; introduced from Europe. New Brunswick to New York, Oregon, and British Columbia.

2. Sophia pinnata (Walt.) Howell, Fl. Northw. Amer. 56. 1897.
Erysimum pinnatum Walt. Fl. Carol. 174. 1788.
Sophia nelsonii Rydb. Bull. Torrey Club **34**: 436. 1907.
Plains and slopes of the artemisia and pinyon belts. Pennsylvania to Florida and California.

3. Sophia incisa (Engelm.) Greene, Pittonia **3**: 95. 1896.
Sisymbrium incisum Engelm.; A. Gray, Mem. Amer. Acad. n. ser. **4**: 8. 1849.
Aspen and spruce belts. Wyoming to New Mexico, Utah, and Nevada.

4. Sophia filipes (A. Gray) Heller, Bull. Torrey Club **24**: 311. 1897.
Sisymbrium incisum filipes A. Gray, Mem. Amer. Acad. n. ser. **4**: 8. 1849.
Canyons and mountain sides, upward to the spruce belt. Saskatchewan to North Dakota, California, and British Columbia.

5. Sophia viscosa Rydb. Bull. Torrey Club **29**: 238. 1902.
Plains and grassy slopes of the artemisia belt. Wyoming to Nevada and British Columbia.

6. Sophia procera Greene, Pittonia **4**: 199. 1900.
Aspen and spruce belts. Wyoming to New Mexico, Utah, and Nevada.

7. Sophia paradisa Nels. & Kennedy, Proc. Biol. Soc. Washington **19**: 155. 1906.
Desert areas and artemisia plains. Nevada and southern California.

8. Sophia sonnei (Robins.) Greene, Pittonia **3**: 95. 1896.
Sisymbrium incisum sonnei Robinson in A. Gray, Syn. Fl. **1**^{1}: 140. 1895.
Sophia leptostylis Rydb. Bull. Torrey Club **39**: 325. 1912.
Aspen and spruce belts. Utah to California.

9. Sophia hartwegiana (Fourn.) Greene, Pittonia 3: 95. 1896.
Sisymbrium hartwegianum Fourn. Rech. Crucif. 66. 1865.
Plains and mountain sides, upward to the spruce belt. Alberta and British Columbia, southward to New Mexico and California.

33. ARABIDOPSIS Schur.

1. Arabidopsis thaliana (L.) Britton in Britt. & Brown, Illustr. Fl. 2: 176. 1913.
Arabis thaliana L. Sp. Pl. 665. 1753.
Waste places; introduced from Europe. Massachusetts to Georgia, westward to Utah.

34. ARABIS L. Rockcress

Stem leaves commonly not auriculate or clasping.
Petals 8 to 12 mm. long. Pods and calyx stellate-pubescent, the former 4 to 6 cm. long, 2 to 3 mm. wide; seeds in two rows; plants 30 cm. high or more.
Petals dark purple above; leaves oblanceolate to linear, stellate-pubescent.
Stems from a woody base——11. A. pulchra.
Petals white; leaves linear-oblanceolate to linear, densely stellate-pubescent——12. A. formosa.
Petals 3 to 6 mm. long, white or purple.
Leaves hirsute, spatulate to oblanceolate; pods 1 to 3 cm. long, 1 mm. wide or less, erect——2. A. nuttallii.
Leaves stellate-pubescent to glabrous; pods 2.5 to 6 cm. long, 2 to 5 mm. wide.
Sepals stellate-pubescent; pods spreading or reflexed. Plants cespitose, 10 to 20 cm. high, with glabrous stems; leaves obovate to oblong. 17. A. polyclada.
Sepals mostly glabrous; pods erect or nearly so.
Petals purple; pods about 2 mm. wide; leaves ovate-lanceolate to oblanceolate, finely stellate-pubescent——3. A. depauperata.
Petals white or rose-colored; pods 3 to 5 mm. wide; leaves oblanceolate to linear, glabrous or pubescent——4. A. platysperma.
Stem leaves auriculate or clasping.
Leaves more or less hirsute, oblanceolate to spatulate. Pods about 1 mm wide, erect.
Basal leaves entire or slightly toothed; sepals nearly equal; petals 3 to 5 mm. long, yellowish white; pods 3 to 4 cm. long, 1 mm. wide. 7. A. ovata.
Basal leaves sinuate-toothed; two sepals strongly saccate; petals 6 to 10 mm. long, white; pods 4 to 7 cm. long——8. A. rupestris.
Leaves glabrous or more or less stellate-pubescent or with branched hairs.
Stem leaves glabrous or nearly so, often ciliate.
Pods erect or nearly so. Petals 4 to 8 mm. long, white or purple; plants 20 cm. high or more.
Stem leaves 3 to 10 cm. long, entire, the basal lyrate-pinnatifid to toothed. Petals yellowish white; pods 3.5 to 10 cm. long, 1 to 1.5 mm. wide——1. A. glabra.
Stem leaves 1 to 4 cm. long, lanceolate.
Stems mostly solitary, 30 to 60 cm. high. Basal leaves oblanceolate; petals 6 to 10 mm. long, pink or white; pods 5 to 8 cm. long, 1.5 to 3 mm. wide——9. A. drummondii.

Stems mostly more or less cespitose, 10 to 30 cm. high.
Basal leaves oblanceolate.
Pods about 6 cm. long, 3 to 5 mm. wide_____5. **A. platyloba.**
Pods 2 to 4 cm. long, 1 to 1.5 mm. wide. Petals white, 5 mm. long_____6. **A. microphylla.**
Basal leaves narrowly oblanceolate. Petals 7 to 8 mm. long, purple; pods 4 to 6 cm. long, 2 mm. wide or less.
10. A. lyallii.
Pods spreading or deflexed.
Pods 3 to 4 mm. wide, 4 to 7 cm. long, short-beaked. Petals purplish, 6 mm. long; suffrutescent plants, 10 to 30 cm. high; leaves oblanceolate_____16. **A. suffrutescens.**
Pods 2.5 mm. wide or less.
Pods 8 to 10 cm. long. Petals pink or purple, 8 to 10 mm. long; stem leaves 4 to 7 cm. long, lanceolate_____20. **A. stokesiae.**
Pods 3 to 7 cm. long.
Pods reflexed. Petals 6 to 10 mm. long, white or pinkish; plants 30 to 60 cm. high; leaves ample_____25. **A. holboellii.**
Pods spreading.
Petals 8 to 10 mm. long, purple; pods 4 to 7 cm. long; basal leaves stellate-pubescent; plants often branched at base.
21. A. divaricarpa.
Petals 5 to 6 mm. long, purple; pods 3 cm. long; basal leaves glabrous; plants low, more or less cespitose.
22. A. nevadensis.
Stem leaves ciliate or more or less densely stellate-pubescent or pilose.
Leaves ciliate, the basal oblanceolate, those of the stem oblong. Petals small, purple; pods 2 to 3 cm. long, reflexed_____28. **A. pendulina.**
Leaves stellate-pubescent or hirsutulous.
Stem leaves (at least some of them) scarcely sagittate. Plants densely canescent; petals white or purplish, 5 to 6 mm. long; pods 4 to 6 cm. long, 2 mm. wide, reflexed_____32. **A. exilis.**
Stem leaves decidedly sagittate or auriculate.
Plants low, 15 cm. high or less, rarely higher, more or less cespitose.
Petals 5 to 7 mm. long, rose to purple. Pods 3 to 4 cm. long, 2 mm. wide_____18. **A. lemmoni.**
Petals 3 to 4 mm. long, deep purple or paler.
Leaves linear-oblanceolate to linear, grayish stellate-pubescent; pods 15 to 25 mm. long, ascending_____3. **A. depauperata.**
Leaves oblanceolate, green, stellate-pubescent; pods 3 to 4 cm. long, reflexed_____24. **A. kennedyi.**
Plants taller, with solitary or few stems, not cespitose.
Pods and calyx pubescent.
Petals pink, 6 to 8 mm. long; pods 2 mm. wide or more. Leaves toothed or entire_____14. **A. subpinnatifida.**
Petals white; pods 1 to 2 mm. wide.
Petals 3 to 4 mm. long; pods 1 to 1.5 cm. long; leaves linear.
15. A. crypta.
Petals 5 to 6 mm. long; pods 4 to 7 cm. long; basal leaves narrowly oblanceolate_____13. **A. macdougalii.**
Pods glabrous (at least at maturity).
Basal leaves linear, 1 to 4 cm. long, densely stellate-canescent.
Petals 4 to 5 mm. long, white or purplish; pods 3 to 5 cm. long, reflexed_____31. **A. canescens.**

Basal leaves broader.
Pods reflexed.
Petals about 5 mm. long, white or pinkish. Basal leaves narrowly oblanceolate, those of the stem linear.
Pods 1 mm. wide, 3 to 3.5 cm. long; petals white to purplish_____26. A. pinetorum.
Pods 2 mm. wide, 1.5 to 3.5 cm. long; petals white.
27. A. caduca.
Petals 7 to 10 mm. long.
Petals dark purple. Pods 3 to 5 cm. long, 1 to 2 mm. wide; pedicels 10 to 15 mm. long; basal leaves narrowly oblanceolate, entire or few-toothed.
29. A. trichopoda.
Petals white or pinkish.
Basal leaves narrowly oblanceolate, entire; pods 3 to 4 cm. long, 2 mm. wide. Pedicels 5 to 8 mm. long.
30. A. lignifera.
Basal leaves oblanceolate, entire or toothed, those of the stem usually ample; pods 4 to 8 cm. long.
25. A. holboellii.
Pods erect, spreading, or arcuate.
Petals 7 to 12 mm. long, dark purple to white. Plants 40 to 70 cm. high, hirsute with branched hairs; leaves oblanceolate to linear-lanceolate; pods arcuate, 6 to 8 cm. long, 2 mm. wide_____19. A. perelegans.
Petals 4 to 7 mm. long, white or purple.
Plant hoary with a fine dense pubescence; leaves narrowly oblanceolate to oblong; pods 6 to 7 cm. long, 2 mm. wide. Sepals stellate-pubescent.
33. A. beckwithii.
Plant from a branching caudex, grayish green; leaves oblanceolate to linear, toothed or entire; pods 2.5 to 5 cm. long, 2 mm. wide_____23. A. perennans.

1. **Arabis glabra** (L.) Bernh. Syst. Verz. Pflanz. 195. 1800.
Turritis glabra L. Sp. Pl. 666. 1753.
Waste places, canyons, and mountainsides; introduced from Europe. Quebec to Pennsylvania, westward to British Columbia and California.

2. **Arabis nuttallii** Robinson in A. Gray, Syn. Fl. 1[1]: 160. 1895.
Aspen and spruce belts. Montana to Washington and Utah.

3. **Arabis depauperata** Nels. & Kennedy, Proc. Biol. Soc. Washington 19: 36. 1906.
Subalpine belt; Sierra Nevada. Western Nevada and California.

4. **Arabis platysperma** A. Gray, Proc. Amer. Acad. 6: 519. 1865.
Aspen and spruce belts. Oregon, Nevada, and California.

5. **Arabis platyloba** Greene, Pittonia 4: 198. 1900.
Aspen and spruce belts. California and Nevada. Similar to the preceding, but glabrous and with auricled stem leaves.

6. **Arabis microphylla** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 82. 1838.
Aspen and spruce belts. Montana to Utah, westward to Washington and Nevada.

7. Arabis ovata (Pursh) Poir. in Lam. Encycl. Suppl. **5**: 557. 1817.
Turritis ovata Pursh, Fl. Amer. Sept. 438. 1814.
Plains, canyons, and mountain sides, upward to the spruce belt. New Brunswick to Georgia, California, and Alaska.

8. Arabis rupestris Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 81. 1838.
Aspen and spruce belts. Saskatchewan to Alaska, southward to Utah and Nevada. Possibly only a form of the preceding species.

9. Arabis drummondii A. Gray, Proc. Amer. Acad. **6**: 187. 1865.
Aspen, spruce, and subalpine belts. Alberta to Utah and New Mexico.

10. Arabis lyallii S. Wats. Proc. Amer. Acad. **11**: 122. 1876.
Spruce and subalpine belts. Montana to British Columbia, California and Utah.

11. Arabis pulchra Jones; S. Wats. Proc. Amer. Acad. **22**: 468. 1887.
Valleys and hillsides of the Great Basin, upward to 2,100 meters. Southern Utah, Nevada, and southern California.

12. Arabis formosa Greene, Pittonia **4**: 198. 1900.
Benches and hillsides of the artemisia and pinyon belts. New Mexico, Colorado, and eastern Utah.

13. Arabis macdougalii Rydb. Bull. Torrey Club **39**: 326. 1912.
Mountain sides, upward to the spruce belt. Montana to northern Nevada (?).

14. Arabis subpinnatifida S. Wats. Proc. Amer. Acad. **20**: 353. 1885.
Plains and hillsides of the artemisia and pinyon belts. Utah to Oregon and California.

15. Arabis crypta Nels. & Macbr. Bot. Gaz. **56**: 473. 1913.
Jarbridge, Elko County, Nevada.

16. Arabis suffrutescens S. Wats. Proc. Amer. Acad. **17**: 362. 1882.
Stony hillsides and canyons, upward to 2,400 meters. Idaho, Washington, northern Nevada (?), and California.

17. Arabis polyclada Greene, Leaflets **2**: 75. 1910.
Subalpine belt; Sierra Nevada. California and western Nevada.

18. Arabis lemmoni S. Wats. Proc. Amer. Acad. **22**: 467. 1887.
Aspen, spruce, and alpine belts. Montana to Utah, westward to British Columbia and California.

19. Arabis perelegans A. Nels. in Coulter, New Man. Rocky Mount. 228. 1909.
Plains and mountain sides, upward to 2,400 meters. Montana to Utah, westward to Washington and Nevada.

20. Arabis stokesiae Rydb. Fl. Rocky Mount. 361, 1062. 1917.
Foothills and canyons, upward to 2,400 meters. Montana to Utah, Nevada, and Idaho.

21. Arabis divaricarpa A. Nels. Bot. Gaz. **30**: 193. 1900.
Pinyon, yellow pine, aspen, and spruce belts. Wyoming to Colorado, Nevada, and Idaho.

22. Arabis nevadensis Tidestrom, Proc. Biol. Soc. Washington **36**: 182. 1923.
Spruce belt; Charleston Mountains, Nevada.

23. Arabis perennans S. Wats. Proc. Amer. Acad. **22**: 467. 1887.
Arabis eremophila Greene, Pittonia **4**: 194. 1900.

Plains and dry hillsides of the Covillea and artemisia belts. Southern California, Nevada, Utah, and Arizona.

24. Arabis kennedyi Greene, Leaflets **2**: 71. 1910.

Aspen and spruce belts; Sierra Nevada. California and western Nevada.

25. Arabis holboellii Hornem. Fl. Dan. **11**: 5. *pl. 1879*. 1827.

Arabis retrofracta Graham, Edinburgh New Phil. Journ. **1829**: 344. 1829.

Plains and mountain sides, upward to the spruce belt. Greenland to British Columbia, southward to Nebraska, Utah, and California.

26. Arabis pinetorum Tidestrom, Proc. Biol. Soc. Washington **36**: 182. 1923.

Coniferous forests; Sierra Nevada. California and western Nevada.

27. Arabis caduca A. Nels. in Coulter, New Man. Rocky Mount. 229. 1909.

Plains and hillsides, upward to 2,400 meters. Wyoming and Utah.

28. Arabis pendulina Greene, Leaflets **2**: 81. 1910.

Arabis setulosa Greene, Leaflets **2**: 81. 1910.

Yellow pine and aspen belts; Charleston Mountains. Utah and Nevada.

29. Arabis trichopoda Greene, Repert. Nov. Sp. Fedde **5**: 242. 1908.

Arabis pulchra gracilis Jones, Contr. West Bot. **8**: 41. 1898.

Arabis cobrensis Jones, Contr. West Bot. **12**: 1. 1908.

Plains, canyons, and hillsides of the Covillea belt. Southwestern Nevada and southeastern California.

30. Arabis lignifera A. Nels. Bull. Torrey Club **26**: 123. 1899.

Artemisia plains and mountain sides, upward to 2,700 meters. Wyoming, Colorado, and Utah.

31. Arabis canescens Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 83. 1838.

Artemisia plains and mountain sides, upward to 2,400 meters. Montana to Wyoming, Nevada, and Oregon.

32. Arabis exilis A. Nels. Bull. Torrey Club **26**: 123. 1899.

Artemisia plains and mountain sides, upward to 2,400 meters. Montana to Wyoming and Utah.

33. Arabis beckwithii S. Wats. Proc. Amer. Acad. **22**: 467. 1887.

Plains and hillsides; Carson City, Nevada.

35. CHEIRINIA Link. Blistercress

Petals 4 to 9 mm. long; annuals or biennials, 30 to 60 cm. high.

Petals 4 to 5 mm. long; pods 2 to 3 cm. long, 1.5 mm. wide or less. Leaves linear-lanceolate or lanceolate; stem finely strigose. **1. C. cheiranthoides.**

Petals 6 to 9 mm. long; pods 2 mm. wide.

Leaves mostly entire, linear or linear-oblanceolate, canescent; pods 5 cm. long or less, ascending to nearly erect **2. C. inconspicua.**

Leaves repand-dentate or coarsely toothed, lanceolate or oblanceolate; pods 4 to 8 cm. long, spreading **3. C. repanda.**

Petals 10 to 18 mm. long; biennials or short-lived perennials.

Plants more or less cespitose, 10 to 20 cm. high. Petals bright yellow, 15 mm. long; pods erect, 3 to 5 cm. long; leaves linear or linear-oblanceolate, toothed or entire **4. C. nivalis.**

Plants mostly over 20 cm. high.

Beak of pod 5 mm. long. Pods 6 to 7 cm. long, ascending; petals light yellow, 15 to 18 mm. long; leaves linear-oblanceolate to spatulate or broader, strigose, green **5. C. nevadensis.**

Beak of pod 4 mm. long or less.
Plants branching from base.
Beak of pod 3 to 4 mm. long. Pod broad and flat, 5 to 10 cm. long; petals lemon-yellow to deep orange, 18 mm. long; leaves linear to linear-lanceolate, entire or nearly so_____6. C. occidentalis.
Beak of pod 2 mm. long or less.
Plant silvery white; leaves narrowly linear; petals bright yellow, 15 to 18 mm. long; pods 4 to 6 cm. long, ascending.
7. C. bakeri.
Plant green; leaves oblanceolate to linear-spatulate; petals bright yellow, 18 mm. long; pods 4 to 6 cm. long, ascending.
8. C. brachycarpa.
Plants mostly single-stemmed at base, branching or simple above.
Leaves narrowly linear; plant silvery white_____7. C. bakeri.
Leaves (at least some of them) broader; plants not silvery white.
Beak of pod 3 to 4 mm. long_____6. C. occidentalis.
Beak 2 mm. long or less.
Beak about 2 mm. long.
Petals varying from orange to brown-purple; pods erect, 7 to 8 cm. long; leaves linear to oblanceolate, entire or toothed.
9. C. wheeleri.
Petals bright yellow, 15 to 18 mm. long; pods erect, 4 to 6 cm. long; leaves lanceolate to linear-lanceolate, sinuate-toothed_____10. C. elata.
Beak about 1 mm. long. Petals pale, 10 to 15 mm. long.
Stem leaves linear or nearly so; pods erect, 5 to 8 cm. long.
11. C. aspera.
Stem leaves oblanceolate; pods about 8 cm. long, ascending or spreading_____12. C. oblanceolata.

1. **Cheirinia cheiranthoides** (L.) Link, Enum. Pl. **2**: 170. 1822.
Erysimum cheiranthoides L. Sp. Pl. 661. 1753.
Waste places; introduced from Europe. Newfoundland to Alaska, southward to North Carolina, Utah, and Nevada.

2. **Cheirinia inconspicua** (S. Wats.) Rydb. Bull. Torrey Club **39**: 323. 1912.
Erysimum asperum inconspicuum S. Wats. in King, Geol. Expl. 40th Par. **5**: 24. 1871.
Valleys and mountain sides, upward to the spruce belt. Minnesota to Colorado, Nevada, and British Columbia.

3. **Cheirinia repanda** (L.) Link, Enum. Pl. **2**: 171. 1822.
Erysimum repandum L. Amoen. Acad. **3**: 415. 1756.
Waste places; introduced from Europe. Ohio to Oregon and Arizona.

4. **Cheirinia nivalis** (Greene) Rydb. Bull. Torrey Club **39**: 324. 1912.
Cheiranthus nivalis Greene, Pittonia **3**: 137. 1896.
Spruce and alpine belts; La Sal Mountains, Utah. Colorado and eastern Utah.

5. **Cheirinia nevadensis** Heller, Muhlenbergia **8**: 96. 1912.
Aspen and spruce belts. California and Nevada.

6. **Cheirinia occidentalis** (S. Wats.) Tidestrom.
Cheiranthus occidentalis S. Wats. Proc. Amer. Acad. **23**: 261. 1888.
Artemisia and pinyon belts. Washington, Oregon, and Nevada.

7. Cheirinia bakeri (Greene) Rydb. Bull. Torrey Club **39**: 324. 1912.
Cherianthus bakeri Greene, Pittonia **4**: 235. 1900.
Pinyon belt. Southwestern Colorado, southern Utah, New Mexico, and Arizona.

8. Cheirinia brachycarpa Rydb. Bull. Torrey Club **39**: 325. 1912.
Aspen and spruce belts. Utah.

9. Cheirinia wheeleri (Rothr.) Rydb. Bull. Torrey Club **39**: 324. 1912.
Erysimum wheeleri Rothr. in Wheeler, Rep. U. S. Surv. 100th. Merid. **6**: 64. 1879.
Artemisia belt, upward to the subalpine belt. Colorado, New Mexico, Utah, and Arizona.

10. Cheirinia elata (Nutt.) Rydb. Bull. Torrey Club **39**: 323. 1912.
Erysimum elatum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 95. 1838.
Artemisia plains, mountain sides, and canyons, upward to the spruce belt. North Dakota to New Mexico, westward to Washington and California.

11. Cheirinia aspera (Nutt.) Rydb. Bull. Torrey Club **39**: 323. 1912.
Cheiranthus asper Nutt. Gen. Pl. **2**: 69. 1818.
Cheiranthus asperrimus Greene, Pittonia **3**: 133. 1896.
Dry hills, upward to 2,400 meters. South Dakota to British Columbia, southward to New Mexico and Arizona.

12. Cheirinia oblanceolata Rydb. Bull. Torrey Club **39**: 324. 1912.
Aspen, spruce, and subalpine belts. Wyoming, Colorado, and Utah.

36. ALYSSUM L. Alyssum

1. Alyssum alyssoides L. Syst. Nat. ed. 10. 1130. 1759.
Clypeola alyssoides L. Sp. Pl. 652. 1753.
Fields and waste places; introduced from Europe. New Hampshire to New Jersey, westward to British Columbia and California.

37. MALCOLMIA R. Br.

1. Malcolmia africana (L.) R. Br. in Ait. Hort. Kew. ed. 2. **4**: 121. 1812.
Hesperis africana L. Sp. Pl. 663. 1753.
About settlements and on mesas; introduced from the Old World. Southern Europe, northern Africa, and in the Orient.

38. PARRYA R. Br.

Leaves (basal) runcinately toothed, glandular-hirsute, linear-oblanceolate; calyx about 7 mm. long; petals 15 to 18 mm. long; pods 4 cm. long, 5 mm. wide or more, acute, constricted; plant 15 to 20 cm. high, scapose. **1. P. platycarpa.**

Leaves (basal) entire, grayish-tomentose, oblanceolate to obovate, 10 cm. long or less; calyx about 5 mm. long; pods acuminate. not constricted; plants 15 cm. high or more, with reduced oblong stem leaves.

Pods 3 to 5 mm. wide, 3 to 5 cm. long, linear-lanceolate; pedicels 5 to 8 mm. long; petals 10 mm. long or less, purple ..... **2. P. menziesii.**

Pods 2 to 3 mm. wide, 3 to 7 cm. long, linear; pedicels 10 to 15 mm. long. **3. P. pedicellata.**

1. Parrya platycarpa Rydb. Bull. Torrey Club **39**: 326. 1912.
Spruce and alpine belts; Uintah Mountains, Utah.

2. Parrya menziesii (Hook.) Greene, Fl. Franc. 253. 1891.
Hesperis menziesii Hook. Fl. Bor. Amer. **1**: 60. 1830.
Hillsides and canyons of the artemisia and pinyon belts. Washington to California and Nevada.

3. Parrya pedicellata (A. Nels.) Tidestrom.
Arabis pedicellata A. Nels. Proc. Biol. Soc. Washington **17**: 91. 1904.
Foothills and canyons, upward to 2,700 meters. Western Nevada.

39. CONRINGIA Adans. HARES-EAR-MUSTARD

1. Conringia orientalis (L.) Dum. Fl. Belg. 123. 1827.
Brassica orientalis L. Sp. Pl. 666. 1753.
Waste places and fields; introduced from the Orient. New Brunswick to Delaware, westward to Washington and Nevada.

50. CAPPARIDACEAE. Caper Family

Annuals (our species), 1 meter high or less; leaves alternate, palmately compound, mostly 3-foliolate; flowers 4-merous, racemose or glomerate; sepals distinct or nearly so; petals clawed; stamens 6 or more, mostly exserted; ovary sessile or stipitate, 1-celled (didymous in Nos. 3 and 4), the placentae parietal; style 1; fruit (in our species) a few many-seeded capsule.

Flowers in dense axillary glomerules. Petals yellow (?); ovary with a short stout stipe; style subulate, becoming spinescent; capsule obovate; leaflets stalked, elliptic, glabrous, 2.5 cm. long or more ..... 4. **OXYSTYLIS.**
Flowers axillary or in racemes, not glomerate.
  Stamens 12 or more. Petals purple, 8 to 12 mm. long, entire or retuse; pods sessile, linear, 4 to 5 cm. long; plants glandular, branched; leaflets oval to oblanceolate, 2 to 5 cm. long ..... 5. **POLANISIA.**
  Stamens 6.
    Pods didymous, 2 to 4-seeded, the valves pyriform, not tuberculate. Petals yellow, small; leaflets glabrous, elliptic, cuneate, 15 to 30 mm. long. ..... 3. **WISLIZENIA.**
    Pods not didymous, several to many-seeded, stipitate.
      Pods mostly linear, 2 to 7 cm. long (oval in one species); flowers 5 to 10 mm. long ..... 1. **CLEOME.**
      Pods mostly broader than long, few-seeded, more or less flattened, the valves helmet-like; flowers small, yellow ..... 2. **CLEOMELLA.**

1. CLEOME L.

Flowers rose-purple to white. Petals 8 to 10 mm. long; leaflets obovate-oblong, entire or rarely denticulate, 3 to 10 cm. long.
  Calyx lobes lanceolate to ovate, acuminate; pods 2.5 to 5 cm. long, 4 to 6 mm. wide ..... 1. **C. serrulata.**
  Calyx lobes broadly triangular, abruptly acuminate; pods 6 to 7 cm. long, 4 mm. wide ..... 1a. **C. serrulata angusta.**
Flowers yellow.
  Stamens not exserted. Petals spatulate, 6 to 7 mm. long; pods linear, 12 to 20 mm. long; leaflets fleshy, spatulate or oblong, 6 to 10 mm. long; plant glabrous, 10 to 25 cm. high ..... 4. **C. sparsiflora.**
  Stamens much exceeding the petals. Pods long-stipitate; plants 15 to 60 cm. high.

Plant glabrous (at least below); calyx 4-cleft; pods linear, 2 to 3.5 cm. long; leaflets linear-lanceolate to oblong----------2. C. lutea.
Plant pubescent; calyx cleft to base; pods oval, flat, 12 to 18 mm. long; leaflets oval or oblong----------3. C. platycarpa.

1. Cleome serrulata Pursh, Fl. Amer. Sept. 441. 1814.
Peritoma serrulatum DC. Prodr. 1: 237. 1824.
Artemisia plains and mountain sides, upward to 2,700 meters. Saskatchewan to Missouri, westward to Washington and Arizona.

1a. Cleome serrulata angusta (Jones) Tidestrom.
Cleome integrifolia angusta Jones, Proc. Calif. Acad. II. 5: 625. 1895.
Artemisia plains and mountain sides, upward to 2,100 meters. Utah and Nevada.

2. Cleome lutea Hook. Fl. Bor. Amer. 1: 70. 1830.
Plains and mountain sides of the artemisia and pinyon belts. Nebraska to New Mexico, Arizona, and Washington.

3. Cleome platycarpa Torr. in Wilkes, U. S. Expl. Exped. 17: 235. *f.* 2. 1874.
Artemisia plains and foothills. Idaho to Oregon, Nevada, and northern California.

4. Cleome sparsiflora S. Wats. in King, Geol. Expl. 40th Par. 5: 32. *pl.* 5. 1871.
Desert areas and valleys of the Covillea and artemisia belts. Nevada and southern California.

2. CLEOMELLA A. DC.

Plant hirsute or pubescent, 15 to 40 cm. high. Leaflets obovate to obovate-oblong, succulent, 1 cm. long or more; petals spatulate; pods rhomboid-globose, the stipe long and slender----------11. C. obtusifolia.
Plants glabrous or nearly so.
Stipe not exceeding the pod in length.
Leaflets elliptic-oblong, 1 to 2 cm. long. Petals oblong-lanceolate; pods 4 to 5 mm. long, obovate or rounded, truncate or rounded at apex; plant 5 to 25 cm. high----------10. C. palmerana.
Leaflets linear to linear-spatulate. Plants 5 to 30 cm. high; stamens not exserted.
Leaflets apiculate; petals roundish; pods globose-ovate; plant diffusely branching----------4. C. brevipes.
Leaflets mostly obtuse; petals obovate; pods obovate; stems slender, at length diffuse----------3. C. parviflora.
Stipe much longer than the capsule.
Leaflets linear. Stamens exserted.
Pod broadly rhomboidal, 3 to 4 mm. wide; seed checkered; petals oblong, 3 to 4 mm. long; plant diffuse----------1. C. plocasperma.
Pod ovate, 4 mm. long; seed smooth; petals 6 mm. long; plant erect or diffuse----------2. C. oocarpa.
Leaflets linear-oblong or broader.
Leaflets linear-oblong, 2 to 4 cm. long. Petals 3 mm. long; pod rhombic-ovate, 3 to 4 mm. long----------5. C. stenosperma.
Leaflets broadly oblong to elliptic.
Petals oblong, 2 to 8 mm. long, varying on the same plant.
Pod more or less deltoid, with truncate apex, 8 to 10 mm. broad; seeds rugose or pitted----------6. C. grandiflora.

Pod deltoid-ovate, with rounded apex, 6 to 8 mm. broad; seeds smooth----------**7. C. hillmani.**

Petals oval, 3 to 4.5 mm. long. Seeds smooth.

Plant 3 to 8 cm. high; pods rhomboid-ovate, not winged, 4 mm. long; leaflets 6 to 10 mm. long----------**8. C. nana.**

Plant 20 to 30 cm. high; pods broadly rhombic, 3 mm. long, winged; leaflets 1 to 2 cm. long----------**9. C. cornuta.**

1. Cleomella plocasperma S. Wats. in King, Geol. Expl. 40th Par. **5**: 33. 1871.
Cleomella gracilis T. S. Brandeg. Bot. Gaz. **27**: 444. 1899.

Desert areas and hillsides of the Covillea and artemisia belts. Southern Utah and Nevada.

2. Cleomella oocarpa A. Gray, Proc. Amer. Acad. **11**: 72. 1875.

Saline plains of the Covillea belt. Southern Nevada and southern California.

3. Cleomella parviflora A. Gray, Proc. Amer. Acad. **6**: 520. 1865.

Valleys, desert areas, and plains of the Covillea and artemisia belts. Oregon to Nevada and southern California.

4. Cleomella brevipes S. Wats. Proc. Amer. Acad. **17**: 365. 1882.

Washes, salt meadows, and along saline lakes. Oregon and Nevada.

5. Cleomella stenosperma Coville; Tidestrom, Proc. Biol. Soc. Washington **36**: 182. 1923.

Desert areas. Nevada and Oregon.

6. Cleomella grandiflora (S. Wats.) Coville.
Cleomella longipes (?) *grandiflora* S. Wats. in King, Geol. Expl. 40th Par. **5**: 34. 1871.

Valleys and foothills of the artemisia belt. California and western Nevada.

7. Cleomella hillmani A. Nels. Proc. Biol. Soc. Washington **18**: 171. 1905.

Plains and foothills of the artemisia belt. Western Nevada.

8. Cleomella nana Eastw. Bull. Torrey Club **30**: 490. 1903.

Plains and hillsides of the artemisia belt. Eastern Utah.

9. Cleomella cornuta Rydb. Bull. Torrey Club **30**: 249. 1903.

Plains and hillsides of the artemisia belt. Utah.

10. Cleomella palmerana Jones, Zoe **2**: 236. 1891.

Plains and hillsides of the artemisia belt. Colorado and eastern Utah.

11. Cleomella obtusifolia Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 311. 1845.

Desert areas and hillsides of the Covillea belt. California, Nevada, and Arizona.

3. WISLIZENIA Engelm.

1. Wislizenia melilotoides Greene, Proc. Biol. Soc. Washington **19**: 130. 1906.

Plains and washes of the Covillea belt. Northern Arizona and southern Nevada.

4. OXYSTYLIS Torr. & Frém.

1. Oxystylis lutea Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 313. 1845.

Desert areas and dry hillsides of the Covillea and artemisia belts. Southern Nevada and southern California.

5. POLANISIA Raf.

1. Polanisia trachysperma Torr. & Gray, Fl. N. Amer. 1: 669. 1840.

CLAMMYWEED.

Plains, valleys, and canyons of the artemisia and pinyon belts. Saskatchewan to Missouri, Texas, and Nevada.

51. RESEDACEAE. Mignonette Family

Mostly herbs with alternate or fascicled leaves; stipules glandlike or none; flowers (in our species) in terminal spikes, small, asymmetric, 4 to 7-merous; petals hypogynous, mostly laciniate; stamens 3 or more; styles none; ovary of 3 carpels, united to near the tips; capsule 3 to 6-beaked, dehiscing at apex; placentae parietal or inserted at base of ovary; seeds numerous, reniform or horseshoe-shaped.

1. DIPETALIA Raf.

1. Dipetalia linifolia (Vahl) Tidestrom.

Reseda linifolia Vahl in Hornem. Hort. Hafn. 2: 501. 1815.

Low ground of the Covillea belt. Southern California to western Texas; Canary Islands to Morocco, Egypt, and northern India.

52. DROSERACEAE. Sundew Family

Glandular-pubescent scapose biennials or perennials; leaves long-petioled, with purplish glandular hairs; flowers racemose; sepals 4 or 5, distinct or nearly so; petals 5 (to 8), hypogynous, united at base; stamens as many as the petals; ovary 1-celled; styles usually 3 (2 to 5), distinct or united; placentae parietal; fruit a many-seeded, 2 to 5-valved capsule.

1. DROSERA L. SUNDEW

Leaf blades suborbicular ..... 1. D. rotundifolia.
Leaf-blades linear-oblanceolate ..... 2. D. longifolia.

1. Drosera rotundifolia L. Sp. Pl. 281. 1753.

Bogs and wet meadows; Idaho and Sierra Nevada. Arctic America, southsouthward to Florida, Idaho, and California; also in Europe and Asia.

2. Drosera longifolia L. Sp. Pl. 282. 1753.

Bogs and wet meadows; Idaho and Sierra Nevada. Arctic America, southward to Michigan, Idaho, and California; also in Europe and Asia.

53. CRASSULACEAE. Stonecrop Family

Herbs (in our species), mostly succulent; flowers perfect or unisexual, solitary or cymose, sometimes racemose; calyx 4 or 5-parted; petals 4 or 5, distinct or more or less united; stamens of the same number or twice as many as the calyx lobes; carpels and styles 4 or 5; ovules few to many; fruit follicular, the follicles few to many-seeded.

Leaves opposite, entire, linear-oblong; flowers solitary, axillary; stamens 4 or 5. Annual, 1 to 8 cm. high, with weak slender stems. ..... 4. TILLAEASTRUM.
Leaves mostly alternate, toothed or entire; flowers axillary or cymose; stamens 8 or 10.
  Flowers axillary, arranged in a dense raceme or spikes. Petals rose-colored, twice longer than the linear-lanceolate sepals; stems 15 to 35 cm. high, from a thick rootstock; leaves oblong to oblong-lanceolate. ..... 3. CLEMENTSIA.

Flowers terminal, racemose or cymose.

Flowers yellow or red, perfect; sepals and also the petals often united below; perennials with slender rootstocks and more or less tufted stems ..... 1. SEDUM.

Flowers red, polygamous or dioecious; sepals and petals distinct; perennials with thick rootstocks. Leaves obovate to obovate-oblong. ..... 2. RHODIOLA.

1. SEDUM L. Stonecrop

Petals united below the middle, yellow or reddish, 6 to 8 mm. long. Stems 3 to 12 cm. high, decumbent; leaves oblong to nearly orbicular, obtuse, sessile ..... 1. S. debile.

Petals distinct or nearly so, yellow.

Plants more or less tufted, 8 to 20 cm. high; leaves terete or nearly so, oblong to linear-oblanceolate, blunt ..... 2. S. stenopetalum.

Plants with few stems, 10 to 30 cm. high; leaves more or less flattened, lanceolate to linear-lanceolate, acuminate ..... 3. S. douglasii.

1. Sedum debile S. Wats. in King, Geol. Expl. 40th Par. **5**: 102. 1871.
Gormania debilis Britton, Bull. N. Y. Bot. Gard. **3**: 30. 1903.

Rocky places of the aspen, spruce, and alpine belts. Utah and Nevada to Idaho and Oregon.

2. Sedum stenopetalum Pursh, Fl. Amer. Sept. 324. 1814.

Rocky places of the aspen and spruce belts. South Dakota to Nebraska, New Mexico, and California.

3. Sedum douglasii Hook. Fl. Bor. Amer. **1**: 228. 1834.

Rocky places of the aspen and spruce belts. Montana to British Columbia, Idaho, and California.

2. RHODIOLA L.

1. Rhodiola integrifolia Raf. Atl. Journ. **1**: 146. 1832. Roseroot.

Spruce and alpine belts. Colorado to California and Alaska.

3. CLEMENTSIA Rose

1. Clementsia rhodantha (A. Gray) Rose, Bull. N. Y. Bot. Gard. **3**: 3. 1903. Red-orpine.

Sedum rhodanthum A. Gray, Amer. Journ. Sci. II. **33**: 405. 1862.

Spruce and alpine belts. Montana to Utah and Arizona.

4. TILLAEASTRUM Britton

1. Tillaeastrum aquaticum (L.) Britton, Bull. N. Y. Bot. Gard. **3**: 1. 1903.
Tillaea aquatica L. Sp. Pl. 128. 1753.

Wet places and along ponds of the artemisia belt, upward to the spruce belt. Nova Scotia to Washington, southward to Maryland, Texas, and Lower California.

54. SAXIFRAGACEAE. Saxifrage Family

Annual or perennial herbs; leaves alternate or opposite, mostly without stipules; flowers in racemes, cymes, or panicles, perfect (in our species), mostly 5-merous; ovary free or adnate to the calyx tube; ovules on a parietal, central, or basal placenta; fruit a capsule or of follicles.

Petals variously lobed, cleft, or pinnatisect, white or pinkish. Placentae parietal.

Rootstock slender, bulbiferous; stems with few leaves; leaves ternately cleft or divided, the lobes toothed; petals 3 to 5-cleft; stamens 10; styles 3; fruit a 3-celled capsule; plants glandular-puberulent.

6. LITHOPHRAGMA.

Rootstock stout, scaly; basal leaves cordate or reniform, toothed or lobed; petals 3-toothed, lobed, or pinnatisect; stamens 5; styles 2 or wanting; fruit a 2-valved capsule; plants mostly scapose----------**7. MITELLA.**

Petals entire or wanting.

Petals wanting. Stoloniferous perennial; leaves reniform, broad-toothed, 4 to 12 cm. broad; flowers axillary; stamens 4 to 8; styles 2; placentae parietal; fruit a 2-valved capsule----------**8. CHRYSOSPLENIUM.**

Petals present.

Stamens 10.

Gynoecium of equal (symmetrical) carpels, the placentae central; fruit follicular----------**3. SAXIFRAGA.**

Gynoecium of two very unequal carpels, the placentae parietal. Glandular and pilose plant, 15 to 40 cm. high; leaves broadly cordate, 3 or 5-lobed, crenate; petals white; stamens exserted; fruit a capsule.

4. TIARELLA.

Stamens 5.

Plant caulescent, 10 to 30 cm. high. Rootstock short, bulbiferous; leaves reniform, 5 or 7-lobed, coarsely toothed; calyx urceolate; ovary free; fruit follicular----------**1. BOLANDRA.**

Plants caulescent or acaulescent, with scaly, more or less elongated rootstocks. Petals white.

Leaf blades deeply 7-lobed, reniform, the lobes coarsely serrate; ovary and capsule 2-celled. Placentae central; glandular-villous plant, 30 to 100 cm. high----------**2. THEROPHON.**

Leaf blades with shallow, crenate or crenate-serrate lobes, reniform to cordate-ovate; ovary and capsule 1-celled----**5. HEUCHERA.**

1. BOLANDRA A. Gray

1. Bolandra californica A. Gray, Proc. Amer. Acad. **7**: 341. 1868.

Cliffs and wet rocks; Lake Tahoe region. California and western Nevada.

2. THEROPHON Raf.

1. Therophon majus (A. Gray) Wheelock, Bull. Torrey Club **23**: 70. 1896.

Boykinia major A. Gray in S. Wats. Bot. Calif. **1**: 196. 1876.

Aspen and spruce belts; Sierra Nevada. Montana to Washington and southern California.

3. SAXIFRAGA L. Saxifrage

Plants acaulescent.

Leaf blades linear to linear-lanceolate, entire or nearly so. Plants 5 to 20 cm. high, glandular-pubescent; scape paniculate; follicles 4 mm. long.

9. S. bryophora.

Leaf blades oval to reniform, entire or coarsely toothed.

Leaf blades cordate-reniform, crenate-dentate, glabrous or nearly so; petals small. Plants 10 to 30 cm. high; scapes paniculate, glandular above; follicles 6 to 8 mm. long----------**8. S. arguta.**

Leaf blades oval to elliptic, never cordate or reniform; petals exceeding the sepals .

Cymules aggregate into a head, with or without 1 or 2 peduncled cymules below; plants 5 to 30 cm. high; leaves rhombic-ovate, crenate, mostly glabrous; follicles 3 to 3.5 mm. long.

5. S. rhomboidea.

Cymules in narrow panicles; plants 20 to 100 cm. high, more or less glandular-pubescent; leaves elliptic to oblong; follicles 3.5 to 5 mm. long.

Petals 2 to 2.5 mm. long---**6. S. sierrae.**

Petals 3 to 4 mm. long---**7. S. oregana.**

Plants caulescent. (Leaves mostly near the base in No. 15.)

Leaf blades orbicular to reniform, as broad as long or broader.

Leaf blades orbicular, large, shallowly lobed, the lobes 3-toothed; plants 30 cm. high or less. Flowers paniculate; petals 3 to 4 mm. long; follicles 4 to 6 mm. long---**15. S. mertensiana.**

Leaf blades (of lower leaves) broader than long, 3 to 7-lobed, the lobes entire; plants 3 to 20 cm. high.

Inflorescence with normal flowers; follicles 6 mm. long; plant nearly glabrous---**1. S. debilis.**

Inflorescence with normal flowers above and bulblets below; follicles undeveloped; plant glandular-pubescent---**2. S. cernua.**

Leaf blades longer than broad, entire or variously cleft. Plants more or less glandular, 1 to 16 cm. high.

Leaves 3 to 7-toothed or cleft.

Leaves (at least some) 3-toothed, cuneate to spatulate; petals cuneate-oblong, 3 mm. long or more; follicles 3.5 to 5.5 mm. long.

3. S. adscendens.

Leaves more or less deeply 3 or 5-lobed; petals oblong to obovate, 1.5 mm. long; follicles 5 to 6 mm. long---**4. S. micropetala.**

Leaves entire.

Leaf blades spine-tipped, 7 to 14 mm. long, ciliate, lanceolate to subulate.

Plants tufted, 10 cm. high or less.

Plants with arching stolons; flowers yellow, solitary or few.

13. S. flagellaris.

Plants not stoloniferous; flowers white, numerous. Follicles 6 to 9 mm. long---**12. S. bronchialis.**

Leaf blades not spine-tipped.

Petals yellow. Leaves elliptic to spatulate, obtuse, glabrous; flowers 1 or 2.

Petals elliptic to oblong, 9 to 13 mm. long; stem leaves not much reduced---**11. S. hirculus.**

Petals oval to obovate, 5 to 7 mm. long; stem leaves much reduced.

10. S. chrysantha.

Petals not yellow.

Petals lilac to purple, oval, 8 to 9 mm. long; stems 1 to 3 cm. high; leaves opposite, obovate, ciliate, densely imbricate, 3 to 5 mm. long---**16. S. oppositifolia.**

Petals white, cuneate-elliptic, 4 to 5 mm. long; stems 4 to 10 cm. high; leaves alternate, oblong to linear---**14. S. ledifolia.**

1. Saxifraga debilis Engelm. Proc. Acad. Phila. **1863**: 62. 1863.

Spruce and alpine belts. Wyoming, Colorado, Utah, and New Mexico.

2. Saxifraga cernua L. Sp. Pl. 403. 1753.

Alpine belt; La Sal Mountains, Utah. Greenland to Alaska, southward to northern New Mexico and Utah.

3. Saxifraga adscendens L. Sp. Pl. 405. 1753.

Spruce and alpine belts. Alberta and British Columbia, southward to Colorado and Utah.

4. Saxifraga micropetala (Small) Fedde, Just's Bot. Jahresb. **33**: 613. 1906.
Muscaria micropetala Small, N. Amer. Fl. **22**: 129. 1905.
Muscaria delicctula Small, N. Amer. Fl. **22**: 129. 1905.
Spruce and alpine belts. Alberta and Montana to Colorado and Utah.

5. Saxifraga rhomboidea Greene, Pittonia **3**: 343. 1898.
Saxifraga nivalis Hook. Fl. Bor. Amer. **1**: 248. 1834, in part. Not *S. nivalis* L. 1753.
Spruce and alpine belts. Montana to New Mexico, Utah, and Nevada.

6. Saxifraga sierrae (Coville) Small, Bull. Torrey Club **23**: 366. 1896.
Saxifraga integrifolia sierrae Coville, Proc. Biol. Soc. Washington **7**: 78. 1892.
Valleys and canyons at 1,800 meters or more. California and western Nevada.

7. Saxifraga oregana Howell, Erythea **3**: 34. 1895.
Micranthes oregana Small, N. Amer. Fl. **22**: 138. 1905.
Micranthes brachypus Small, N. Amer. Fl. **22**: 139. 1905.
Aspen, spruce, and alpine belts. Montana to Colorado, westward to Oregon and California.

8. Saxifraga arguta D. Don, Trans. Linn. Soc. Bot. **13**: 356. 1822.
Saxifraga odontophylla Piper, Contr. U. S. Nat. Herb. **11**: 314. 1906.
Aspen, spruce, and alpine belts. Montana to British Columbia, southward to New Mexico and California.

9. Saxifraga bryophora A. Gray, Proc. Amer. Acad. **6**: 533. 1865.
Aspen and spruce belts; Sierra Nevada. California and western Nevada (?).

10. Saxifraga chrysantha A. Gray, Proc. Amer. Acad. **12**: 83. 1877.
Alpine belt; Uintah Mountains (?). Colorado and New Mexico.

11. Saxifraga hirculus L. Sp. Pl. 402. 1753.
Alpine belt; Uintah Mountains (?). Greenland to Alaska, southward to British Columbia and Colorado; also in Europe.

12. Saxifraga bronchialis L. Sp. Pl. 400. 1753.
Saxifraga austromontana Wiegand, Bull. Torrey Club **27**: 389. 1900.
Aspen, spruce, and alpine belts. Alberta to British Columbia, southward to Utah and New Mexico.

13. Saxifraga flagellaris Willd.; Sternb. Rev. Saxifr. 25. 1810.
Spruce and alpine belts. Greenland to Alaska, southward to New Mexico and Arizona.

14. Saxifraga ledifolia Greene, Pittonia **2**: 101. 1890.
Spruce and alpine belts; Sierra Nevada. Oregon, California, and western Nevada (?).

15. Saxifraga mertensiana Bong. Mém. Acad. St. Pétersb. VI. **2**: 141. 1832.
Spruce belt; Sierra Nevada. Alberta to Alaska, southward to Montana and California.

16. Saxifraga oppositifolia L. Sp. Pl. 402. 1753.
Alpine belt; Teton Range, Wyoming. Greenland to Alaska, southward to Vermont, Wyoming, and British Columbia.

4. TIARELLA L. FOAMFLOWER

1. **Tiarella unifoliolata** Hook. Fl. Bor. Amer. 1: 238. 1834.

Spruce belt; Idaho. Alberta to British Columbia, southward to Montana, Idaho, and California .

5. HEUCHERA L. ALUMROOT

Stamens equaling or exceeding the sepals; calyx glandular-puberulent to white-hairy, campanulate. Inflorescence open; leaf blades cordate-ovate to reniform, round-lobed, the lobes bristle-tipped; petals linear-oblanceolate, twice longer than sepals.

Petioles glabrous or puberulent, rarely sparingly hirsute__1. H. rubescens.

Petioles more or less densely hirsute.

Hypanthium and sepals narrowly turbinate, 4 to 5 mm. long.

2. H. leptomeria.

Hypanthium and sepals campanulate, 4 mm. long or less__3. H. lithophila.

Stamens shorter than the sepals; calyx glandular-puberulent. Plants more or less glandular-puberulent.

Hypanthium saucer-shaped or open-campanulate. Petals spatulate, equaling or exceeding the sepals; leaf blades reniform_____5. H. parvifolia.

Hypanthium urceolate or deeply campanulate.

Inflorescence spiciform; hypanthium and sepals about 7 mm. long; petals usually wanting; leaf blades rounded-oval, rarely cordate.

6. H. ovalifolia.

Inflorescence open, elongate; hypanthium and sepals about 5 mm. long; leaf blades reniform or rounded-cordate_____4. H. flavescens.

1. **Heuchera rubescens** Torr. in Stansb. Expl. Great Salt Lake 388. 1852.

Upper Covillea belt, upward to the spruce belt. Utah to New Mexico, westward to Oregon and eastern California.

2. **Heuchera leptomeria** Greene, Leaflets 1: 112. 1905.

Crevices of rocks of the pinyon belt. New Mexico, Arizona, and southern

3. **Heuchera lithophila** Heller, Muhlenbergia 1: 105. 1904.

Rocky places of the pinyon, yellow pine, and aspen belts. California and western Nevada.

4. **Heuchera flavescens** Rydb. N. Amer. Fl. 22: 114. 1905.

Pinyon and aspen belts; Kaibab Plateau. New Mexico, Arizona, and southern Utah.

5. **Heuchera parvifolia** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 581. 1840.

Aspen, spruce, and alpine belts. Alberta to eastern Oregon, southward to New Mexico and Arizona.

6. **Heuchera ovalifolia** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 581. 1840.

Aspen, spruce, and alpine belts. Alberta and British Columbia, southward to Wyoming, Nevada, and Oregon.

6. LITHOPHRAGMA Nutt. WOODLAND-STAR

Hypanthium obconic, the base acute, 5 to 8 mm. long, densely glandular.

Plants 10 to 30 cm. high_____1. L. parviflora.

Hypanthium campanulate (the base rounded), 3 to 5 mm. long.

Stem leaves usually with axillary bulblets; free portion of stipules fimbriate, rounded. Petals 4 to 7 mm. long_____2. L. bulbifera.

Stem leaves usually without axillary bulblets; free portion of stipules not fimbriate, lanceolate.

Hypanthium 2 to 3 mm. long, nearly equaling the petals; plant 10 to 15 cm. high, glandular-puberulent to nearly glabrous____3. L. tenella.

Hypanthium 3 to 4 mm. long; petals 3 to 5 mm. long; plant 10 to 20 cm. high, glandular-puberulent_____4. L. australis.

1. **Lithophragma parviflora** (Hook.) Nutt.; Torr. & Gray, Fl. N. Amer. 1: 584. 1840.

Tellima parviflora Hook. Fl. Bor. Amer. 1: 239. *pl. 78 A*. 1834.

Aspen and spruce belts. Alberta and British Columbia, southward to Colorado and California.

2. **Lithophragma bulbifera** Rydb. N. Amer. Fl. 22: 86. 1905.

Yellow pine, aspen, and spruce belts. Montana and British Columbia, southward to Black Hills, South Dakota, Colorado, and California.

3. **Lithophragma tenella** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 584. 1840.

Aspen and spruce belts. Alberta to Wyoming, Utah, and Nevada.

4. **Lithophragma australis** Rydb. N. Amer. Fl. 22: 86. 1905.

Aspen and spruce belts. Wyoming to New Mexico, Utah, and Arizona.

7. MITELLA L. Bishopscap

Petals entire or 3-fid, the lobes filiform; plants 30 to 50 cm. high.

Petals 3-fid to the middle, twice longer than the calyx; leaves pilose, indistinctly lobed, crenate_____4. M. stauropetala.

Petals 3-fid at apex, slightly exceeding the calyx; leaves round-lobed and crenate, ciliate, puberulent_____5. M. stenopetala.

Petals pinnatifid or pinnatisect, the lobes filiform; plants 10 to 30 cm. high.

Styles present; stigmas entire; flowering stems 1 to 3-leaved. Leaves cordate or reniform, 5 or 7-lobed, crenate, pilose_____1. M. caulescens.

Styles wanting; stigmas 2-lobed; flowering stems scapose.

Stamens opposite the petals; leaves cordate, the lobes crenate-serrate. 2. M. pentandra.

Stamens opposite the sepals; leaves reniform, the lobes rounded, crenate. 3. M. breweri.

1. **Mitella caulescens** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 586. 1840.

Shaded places of the aspen belt. Montana to British Columbia, Idaho and northern California.

2. **Mitella pentandra** Hook. Curtis's Bot. Mag. 56: *pl. 2933*. 1829.

Aspen, spruce, and alpine belts. Alberta to Alaska, southward to Colorado and California.

3. **Mitella breweri** A. Gray, Proc. Amer. Acad. 6: 533. 1865.

Mountains meadows; Lake Tahoe region. Alberta and British Columbia, southward to Idaho and central California.

4. **Mitella stauropetala** Piper, Erythea 7: 161. 1899.

Spruce belt. Montana to Washington, southward to Colorado and Oregon.

5. **Mitella stenopetala** Piper, Erythea 7: 161. 1899.

Aspen, spruce, and alpine belts. Montana to Washington, southward to Colorado and Oregon.

8. CHRYSOSPLENIUM L. Watercarpet

1. Chrysosplenium tetrandrum T. Fries, Bot. Not. 1858: 193. 1858.
Wet places of the alpine belt; Uintah Mountains (?). Arctic America to Colorado; also in Europe.

55. PARNASSIACEAE. Parnassia Family

Glabrous perennials with short rootstocks; leaves mostly basal, entire, broad; stems usually with 1 leaf near the middle and mostly 1-flowered; flowers 5-merous, white or pale yellow, veined; stamens 5, alternating with as many clusters of gland-bearing, more or less united staminodia; calyx free or partially adherent to the ovary, the latter with 3 or 4 parietal placentae and as many styles; fruit a 1-celled loculicidal 4-valved capsule.

1. PARNASSIA L. Parnassia

Petals fimbriate on the sides, elliptic to obovate. Plants 20 to 40 cm. high.
Free portion of the staminodia very short_____1. P. fimbriata.
Free portion of the staminodia about equaling the united part.
2. P. intermedia.
Petals entire. Free portion of the staminodia about equaling the united part.
Petals elliptic or oval, 6 to 10 mm. long; leaves ovate or oval, abruptly narrowed at base_____3. P. parviflora.
Petals oval to suborbicular, 10 to 15 mm. long; leaves cuneate-ovate.
4. P. californica.

1. Parnassia fimbriata König, Ann. Bot. Kön. & Sims 1: 391. 1805.
Wet places of the spruce and alpine belts. Alberta to Alaska, southward to northern New Mexico.

2. Parnassia intermedia Rydb. N. Amer. Fl. 22: 78. 1905.
Aspen and spruce belts; East Humboldt Mountains. Nevada and Oregon.

3. Parnassia parviflora DC. Prodr. 1: 320. 1824.
Wet places of the aspen and spruce belts. Labrador to Alberta, southward to Quebec, New Mexico, and Nevada.

4. Parnassia californica (A. Gray) Greene, Pittonia 2: 102. 1890.
Parnassia palustris californica A. Gray in S. Wats. Bot. Calif. 1: 202. 1876.
Wet places; Sierra Nevada. Southern Oregon to central California.

56. HYDRANGEACEAE. Hydrangea Family

Shrubs with opposite estipulate simple leaves; flowers solitary or cymose, perfect, white or yellowish; sepals silky, 4 or 5, united below; petals 4 or 5; stamens numerous; styles distinct, united, or wanting; ovary of 2 to 5 carpels; placentae on the inflexed margins of the carpels; fruit a 1-celled, 3 or 4-valved capsule.

Leaves crenate-serrate or serrate, more or less pubescent. Shrubs, 2 meters high or less; bark shreddy; flowers 5-merous; seeds numerous.
2. EDWINIA.
Leaves entire or with distant teeth, 3 to 5-ribbed.
Leaves oblong to ovate, entire or few-toothed. Flowers mostly 4-merous; seeds numerous_____1. PHILADELPHUS.
Leaves linear to linear-lanceolate or oblanceolate, entire.
Flowers 4-merous, 1 to 3; filaments and anthers appendaged; stamens 8; capsule 10 to 12 mm. long; seeds numerous_____3. FENDLERA.

Flowers 5-merous, in compound cymes; filaments and anthers not appendaged; stamens 10; capsule 4 mm. long; seeds solitary in each cavity----------4. **FENDLERELLA.**

1. PHILADELPHUS L. Mockorange

Leaf blades 3 cm. long or more, thin, ovate to ovate-lanceolate, entire or distantly toothed; petals oval, 10 to 15 mm. long. Styles united to the middle----------1. **P. lewisii.**

Leaf blades 2 cm. long or less, thickish, oblong to ovate-lanceolate, entire; petals obovate, 10 to 15 mm. long.

Sepals ovate, acute, glabrous or strigose outside, tomentose inside; capsule obovoid, 8 mm. long----------2. **P. microphyllus.**

Sepals ovate, acute or acuminate, strigose on both sides; capsule short-ovoid, 6 or 7 mm. long----------3. **P. occidentalis.**

1. Philadelphus lewisii Pursh, Fl. Amer. Sept. 329. 1814.

Aspen and spruce belts; Payette and Sawtooth National forests, Idaho. Montana to British Columbia, southward to Idaho and California.

2. Philadelphus microphyllus A. Gray, Mem. Amer. Acad. n. ser. **4:** 54. 1849.

Pinyon, yellow pine, and aspen belts. Southern Colorado, Utah(?), New Mexico, and Arizona.

3. Philadelphus occidentalis A. Nels. Bull. Torrey Club **25:** 374. 1898.

Yellow pine, aspen, and lower spruce belts. Wyoming and Colorado to southern Nevada.

2. EDWINIA Heller

Sepals obtuse, rounded, or mucronate, often retuse, 3 to 4 mm. long in fruit; petals cuneate; capsule equaling the calyx; branches and twigs grayish. Leaves oval, 1 cm. long or more, strigillose, densely so beneath.
2. E. californica.

Sepals acute; petals 10 to 12 mm. long; capsule 4 to 5 mm. long; branches and twigs reddish brown.

Sepals 2 to 3 mm. long, not accrescent in fruit; petals cuneate to oblong; leaves oval to suborbicular, 1 to 6 cm. long, pubescent to tomentose beneath----------1. **E. americana.**

Sepals accrescent in fruit, 5 to 6 mm. long; petals obovate to oblong; leaves oval to ovate, 1 to 2.5 cm. long, strigillose above, tomentose beneath.
3. E. macrocalyx.

1. Edwinia americana (Torr. & Gray) Heller, Bull. Torrey Club **24:** 477. 1897.

Jamesia americana Torr. & Gray, Fl. N. Amer. **1:** 593. 1840.

Aspen and spruce belts. Wyoming to New Mexico and Arizona.

2. Edwinia californica Small, N. Amer. Fl. **22:** 176. 1905.

Yellow pine and aspen belts; Charleston and Panamint mountains. California and southern Nevada.

3. Edwinia macrocalyx Small, N. Amer. Fl. **22:** 176. 1905.

Aspen and spruce belts. Utah and Arizona.

3. FENDLERA Engelm. & Gray

1. Fendlera tomentella Thornber, Contr. U. S. Nat. Herb. **16:** 129. 1913.

Artemisia and pinyon belts. Colorado to Nevada, New Mexico, and Arizona.

4. FENDLERELLA Heller

1. **Fendlerella utahensis** (S. Wats.) Heller, Bull. Torrey Club **25**: 626. 1898.
Whipplea utahensis S. Wats. Amer. Nat. **7**: 300. 1873.

Rocky canyons and mountain sides of the pinyon, yellow pine, and aspen belts. Utah, Nevada, and Arizona.

57. GROSSULARIACEAE. Gooseberry Family

(Contributed by Frederick V. Coville)

Shrubs with broad, alternate, more or less deeply 3 to 5-lobed leaves; flowers mostly racemose; ovary inferior; hypanthium (here used to indicate the free portion of the receptacle above the ovary, sometimes called the calyx tube) varying from cylindric to obsolete; sepals 4 or 5; petals 4 or 5, inserted on the throat of the calyx; stamens 4 or 5; ovary inferior, 1-celled, the placentae 2, parietal; styles 2; fruit a berry.

Plants without nodal spines and without bristles or, if with them, the flowers without an apparent hypanthium; pedicels jointed beneath the ovary, bearing a pair of bractlets just below the joint, or the bractlets obsolete; fruit disarticulating from the pedicel ..... 1. Ribes.

Plants with nodal spines, bristly or without bristles; flowers with an evident hypanthium; pedicels not jointed, the bractlets, if present, minute, situated at the very base of the pedicel and covered by the bract; fruit not disarticulating from the pedicel ..... 2. Grossularia.

1. RIBES L. Currant

Plants with spines or prickles.

Leaves glabrous or nearly so, deeply 5 to 7-lobed, the lobes incised-dentate; flowers 10 to 15, sometimes fewer; berries dark purple or almost black, covered with gland-tipped bristles ..... 1. R. lacustre.

Leaves pubescent or glandular-hairy, deeply 5-lobed or 5-cleft, the lobes incised-serrate; flowers 3 to 7, rarely more; berries bright red, glandular-bristly ..... 2. R. montigenum.

Plants without spines or prickles.

Ovary with sessile glands. Flowers white, in racemes 5 to 12 cm. long; berry black, smooth; leaf lobes broad, serrate, resinous-dotted beneath. 3. R. petiolare.

Ovary with stalked glands or glandless.

Leaves glabrous or nearly so, 3 to 5-lobed, the lobes entire or few-toothed.

Hypanthium and sepals 1 to 2 cm. long, yellow; petals small, erose; berry red, black, or yellow, 6 to 8 mm. in diameter ..... 9. R. aureum.

Leaves pubescent or glandular, or both.

Hypanthium obsolete, the sepals only slightly united at base, beset with glanduliferous hairs. Leaves deeply cordate, the lobes incised or irregularly crenate-dentate; petals fan-shaped; berry black, 10 mm. in diameter ..... 4. R. coloradense.

Hypanthium well developed.

Anthers merely calloused at apex.

Hypanthium and sepals greenish white, the latter 3 to 4 times as long as the tube; petals spatulate; berry black, glandular-bristly; leaves with obtuse, or obtusish, serrate lobes. 10. R. wolfii.

Hypanthium and sepals red or reddish, rarely white; sepals twice longer than the tube; petals white, orbicular to oblong; berry blue, sparingly glandular; leaf lobes obtuse, irregularly crenate-dentate----------11. **R. nevadense.**

Anthers with a cuplike appendage at apex.

Hypanthium two and one-half to four times as long as broad; berry bright red; leaf lobes crenate to crenulate.

Bracts cuneate-obovate, toothed or lobed above; styles usually hairy above----------5. **R. cereum.**

Bracts rhombic, mostly narrowly so, usually acute, entire or with 1 or 2 teeth; styles usually smooth----6. **R. inebrians.**

Hypanthium twice longer than broad or less; leaves with rounded lobes.

Ovary covered with gland-tipped hairs; leaf lobes irregularly crenate-dentate----------7. **R. viscosissimum.**

Ovary smooth; leaf lobes crenate or crenulate----------8. **R. hallii.**

1. Ribes lacustre (Pers.) Poir. in Lam. Encycl. Suppl. **2:** 856. 1812.

Ribes oxyacanthoides lacustre Pers. Syn. Pl. **1:** 252. 1805.

Ribes parvulum Rydb. Mem. N. Y. Bot. Gard. **1:** 203. 1900.

Aspen, spruce, and alpine belts. Newfoundland to Alaska, southward to Pennsylvania, Colorado, and California.

2. Ribes montigenum McClatchie, Erythea **5:** 38. 1897.

Spruce and alpine belts. Montana to British Columbia, southward to New Mexico and California.

3. Ribes petiolare Dougl. Trans. Hort. Soc. Lond. **7:** 514. 1830.

Aspen and spruce belts. Montana to British Columbia, southward to Utah and Nevada.

4. Ribes coloradense Coville, Proc. Biol. Soc. Washington **14:** 3. 1901.

Spruce and alpine belts. Colorado, eastern Utah, and northern New Mexico.

5. Ribes cereum Dougl. Trans. Hort. Soc. Lond. **7:** 512. 1830. WAX CURRANT.

Pinyon, yellow pine, and aspen belts. Montana to British Columbia, southward to Arizona and California.

6. Ribes inebrians Lindl. Bot. Reg. *pl. 1471*, 1832.

Pinyon, yellow pine, aspen, and spruce belts. South Dakota to western Nebraska, westward to Montana, central California, and Arizona.

7. Ribes viscosissimum Pursh, Fl. Amer. Sept 163. 1814.

Aspen and spruce belts. Montana to British Columbia, southward to Colorado and California.

8. Ribes hallii Jancz. "Bull. Acad. Cracovie **1906:** 9. 1906."

Rocky places of aspen and spruce belts. Southern Oregon, western Nevada, and California.

9. Ribes aureum Pursh, Fl. Amer. Sept. 164. 1814.

Chrysobotrya aurea Rydb. Fl. Rocky Mount. 399, 1062. 1917.

Hillsides and along creeks of the artemisia, pinyon, yellow pine, and aspen belts. Saskatchewan to Washington, southward to South Dakota, New Mexico, and California.

10. Ribes wolfii Rothr. Amer. Nat. **8:** 358. 1874.

Aspen, spruce, and alpine belts. Colorado, Utah, New Mexico, and Arizona.

11. Ribes nevadense Kellogg, Proc. Calif. Acad. 1: 65. 1855.

Ribes sanguineum variegatum S. Wats. in King, Geol. Expl. 40th Par. 5: 100. 1871.

Yellow pine and aspen belts; Sierra Nevada. Southern Oregon, western Nevada, and California.

2. GROSSULARIA Mill. Gooseberry

Ovary and fruit densely bristly, the latter purple at maturity.

Hypanthium and sepals deep purple; petals erose; leaves small, reniform-orbicular, pubescent, the lobes incisely crenate-dentate----1. G. roezli.

Hypanthium and sepals orange or purplish; petals entire; leaves nearly orbicular, glabrous to sparingly pubescent, the lobes irregularly incised-serrate----2. G. pinetorum.

Ovary and fruit glabrous, pubescent, or glandular.

Hypanthium and sepals glabrous.

Berry, hypanthium, and sepals yellow. Petals obovate or oblong; leaves cordate-suborbicular, the lobes crenate----5. G. velutina.

Berries bluish black or wine-colored.

Leaves suborbicular, with broadly cuneate to truncate base, the lobes rounded, few-toothed; petals white, cuneate, erose; berry bluish-black----6. G. nivea.

Leaves reniform to suborbicular, the lobes acute, crenate-dentate; petals white or pinkish, obovate; berry wine-colored----7. G. inermis.

Hypanthium and sepals more or less hairy.

Hypanthium as broad as long (with the sepals 5 mm. long), yellow. Petals obovate or oblong; berry yellow; leaves cordate-suborbicular, pubescent, the lobes crenate----5. G. velutina.

Hypanthium 2 to 4 times as long as broad (with the sepals 7 to 10 mm. long). Leaves suborbicular to reniform; petals spatulate.

Leaves glabrous to pubescent, deeply 3 to 5-cleft, the lobes crenate-dentate; flowers white; berry glabrous or glandular-hispid. 3. G. leptantha.

Leaves glandular and sparingly pubescent; flowers yellow; berry glabrous or with few hairs----4. G. lasiantha.

1. Grossularia roezli (Regel) Coville & Britton, N. Amer. Fl. **22**: 215. 1908.

Ribes roezli Regel, Gartenflora **28**: 226. 1879.

Along creeks at 1,800 meters or more; Sierra Nevada. Middle and southern California and western Nevada.

2. Grossularia pinetorum (Greene) Coville & Britton, N. Amer. Fl. **22**: 217. 1908.

ORANGE GOOSEBERRY.

Ribes pinetorum Greene, Bot. Gaz. **6**: 157. 1881.

Yellow pine areas; Kaibab Plateau(?); San Francisco Mountains, Arizona. New Mexico and Arizona.

3. Grossularia leptantha (A. Gray) Coville & Britton, N. Amer. Fl. **22**: 219. 1908.

Ribes leptanthum A. Gray, Mem. Amer. Acad. n. ser. **4**: 53. 1849.

Aspen and spruce belts. Colorado, Utah, New Mexico, and Arizona.

4. Grossularia lasiantha (Greene) Coville & Britton, N. Amer. Fl. **22**: 219. 1908.

Ribes lasianthum Greene, Pittonia **3**: 22. 1896.

Aspen and spruce belts. California and western Nevada.

5. Grossularia velutina (Greene) Coville & Britton, N. Amer. **22**: 220. 1908.

Ribes velutinum Greene, Bull. Calif. Acad. **1**: 83. 1885.

Canyons and slopes of the pinyon, yellow pine, and aspen belts. Utah to Oregon, Arizona, and southern California.

6. Grossularia nivea (Lindl.) Spach, Hist. Nat. Veg. **6**: 179. 1838.

SNOW GOOSEBERRY.

Ribes niveum Lindl. Bot. Reg. *pl. 1692*. 1834.

Pinyon, yellow pine, and aspen belts. Idaho and eastern Washington to central Nevada.

7. Grossularia inermis (Rydb.) Coville & Britton, N. Amer. Fl. **22**: 224. 1908.

WINE GOOSEBERRY.

Ribes inerme Rydb. Mem. N. Y. Bot. Gard. **1**: 202. 1900.

Aspen and spruce belts. Montana to British Columbia, southward to New Mexico and California.

58. ROSACEAE. Rose Family

Herbs, shrubs, or trees; leaves alternate (rarely opposite), simple or compound; stipules commonly present; flowers 5-merous; sepals united at base; petals and the numerous stamens inserted on the calyx tube; carpels one to many; ovary mostly 1-celled; styles 1 to many; fruit mostly of follicles or achenes.

Plants shrubs or small trees.

Leaves compound.

Leaves bipinnate or bipinnatifid. Flowers in panicles; petals white; fruit follicular, coriaceous ---- **4. CHAMAEBATIARIA.**

Leaves once pinnate or digitate.

Plant an unarmed shrub, 1.5 meter high or less; bark shreddy. Leaves pinnate; leaflets 3 to 7, oblong to linear, silky; flowers axillary, yellow ---- **14. DASIPHORA.**

Plants armed or prickly shrubs; bark not shreddy.

Leaves digitate; flowers white; fruit of several fleshy drupelets. **26. RUBUS.**

Leaves pinnate; flowers rose; fruit an aggregation of achenes, enclosed in the fleshy calyx tube ---- **27. ROSA.**

Leaves simple.

Plants undershrubs with depressed branches.

Leaves spatulate to oblanceolate, entire, silky; flowers racemose; fruit follicular, coriaceous ---- **3. PETROPHYTUM.**

Leaves elliptic or oval, crenate, white-tomentose beneath; flowers solitary, scapose; fruit of numerous achenes, tipped with the persistent styles (plumose in fruit) ---- **19. DRYAS.**

Plants shrubs, 30 cm. high or more, or small trees.

Branches spinescent. Leaves linear-clavate, opposite, 5 to 15 mm. long; flowers solitary, 4-merous, yellow; fruit an achene. **18. COLEOGYNE.**

Branches not spinescent.

Leaves palmately lobed, 3 or 5-ribbed.

Leaf blades 1 to 6 cm. long, the lobes rounded or acute; flowers small, in terminal corymbs; fruit follicular, inflated. **1. OPULASTER.**

Leaf blades 5 to 20 cm. long, the lobes acute or acuminate; flowers large, white, in panicles; fruit of several fleshy drupelets. **26. RUBUS.**

Leaves 3-lobed, entire, or dissected.
Leaves glandular-dotted. Flowers solitary.
Flowers white, large, fragrant; ovaries 4 or more, the persistent styles (plumose in fruit) tipping the achenes. **23. COWANIA.**
Flowers yellow, small, not fragrant; ovary 1; style not plumose.
Leaves 3-cleft at apex; glands impressed____**24. PURSHIA.**
Leaves not glandular-dotted.
Leaves 3-cleft, cuneate-obovate, tomentose beneath. Flowers yellow, solitary; fruit fusiform; style not plumose. **24. PURSHIA.**
Leaves not 3-cleft, entire, toothed, or dissected.
Leaves pinnatifid, mostly fascicled, the lobes 3 to 7, linear.
Flowers large, white; fruit of numerous achenes, tipped by the plumose styles_____**22. FALLUGIA.**
Leaves entire, toothed, or lobed.
Flowers solitary or fascicled; petals wanting. Ovary 1; fruit a cylindric achene; style plumose; shrubs or trees with grayish bark and hard wood_____**25. CERCOCARPUS.**
Flowers in corymbs or panicles, white or pinkish.
Fruit of 1 to 5 few-seeded follicles; leaves elliptic-oblong to cuneate-oblong, white-tomentose beneath, mostly serrate above the middle_____**2. SPIRAEA.**
Fruit of numerous long-hairy achenes, enclosed in the calyx; leaves toothed or lobed____**5. SERICOTHECA.**

Plants annual or perennial herbs.
Leaves digitate or ternately divided.
Leaves 2 to 4 times ternately divided into linear divisions. Hirsute and glandular perennial, 10 to 30 cm. high; inflorescence many-flowered; petals obovate, somewhat exceeding the sepals. **16. CHAMAERHODOS.**
Leaves digitate.
Flowers white; calyx flat; receptacle becoming fleshy in fruit, bearing numerous achenes. Stoloniferous plants with 3-foliolate leaves. **12. FRAGARIA.**
Flowers yellow; calyx cup-shaped to hemispheric; fruit of numerous achenes.
Stamens 5; petals linear-oblong; styles lateral; leaves 3-follolate, the leaflets wedge-shaped, 3-toothed at apex_____**13. SIBBALDIA.**
Stamens 20; petals broad; styles terminal; leaves digitate or pinnate. **10. POTENTILLA.**

Leaves (at least the basal ones) pinnate.
Plants prostrate, stoloniferous, perennial. Flowers solitary, axillary, yellow; ovaries numerous; styles lateral_____**11. ARGENTINA.**
Plants commonly with erect or ascending stems.
Styles bent or jointed near the middle. Achenes hirsute, with hooked beaks; pubescent perennials with interruptedly pinnate leaves. **20. GEUM.**

Styles not at all bent or jointed.
Styles nearly basal. Calyx hemispheric, bracted; stamens 20 to 30; flowers yellow; leaflets suborbicular to cuneate-obovate, toothed to incised_____15. **DRYMOCALLIS.**
Styles terminal or nearly so.
Calyx beset with hooked bristles, turbinate, in fruit enclosing the achenes. Leaflets crenate-serrate_____17. **AGRIMONIA.**
Calyx not beset with hooked bristles, bracted (except in No. 8).
Stamens inserted near base of the receptacle. Flowers white, yellow, or purple; fruit of glabrous achenes.
10. POTENTILLA.
Stamens inserted near throat of the calyx; flowers solitary or cymose.
Styles plumose below. Flowers white, yellow, or purplish; fruit of numerous hairy achenes; perennials with lyrate-pinnate leaves_____21. **SIEVERSIA.**
Styles glabrous, or glandular below.
Filaments dilated, petaloid. Petals white or yellow; stamens 10; ovaries 3 to 15, with slender styles; fruit of achenes.
6. HORKELIA.
Filaments filiform.
Calyx not bracted. Glandular low perennial with 2 or 3 pairs of cuneate to suborbicular, toothed leaflets; petals white, acuminate; fruit of smooth achenes on a cylindric receptacle_____8. **PURPUSIA.**
Calyx bracted. Perennials.
Petals dark purple, linear, shorter than the rotate calyx. Leaflets numerous, crowded, glabrous, oblong, 2 to 3-cleft; ovaries few, tipped by long slender styles.
9. COMARELLA.
Petals white or yellow. Leaflets numerous.
Styles glandular below; leaflets crowded and imbricate; ovaries 3 to 15, on a villous receptacle.
7. IVESIA.
Styles glabrous; leaflets not imbricate, cleft or toothed; ovaries numerous_____21. **SIEVERSIA.**

1. OPULASTER Medic. NINEBARK

Follicle one; filaments alternately long and short; low shrub with divaricate branches; leaves reniform, 3-lobed, stellate-pubescent, doubly crenate, about 1 cm. broad_____3. **O. alternans.**
Follicles two; filaments equal or nearly so; shrubs 1 to 2 meters high; leaves ovate to reniform, subcordate, 3 or 5-cleft, glabrous to tomentulous beneath.
Sepals and petals 4 to 5 mm. long; styles erect; mature follicles flattened.
1. O. malvaceus.
Sepals and petals about 3 mm. long; styles more or less spreading; mature follicles turgid_____2. **O. monogynus.**

1. **Opulaster malvaceus** (Greene) Kuntze, Rev. Gen. Pl. **2**: 949. 1891.
Spiraea pauciflora Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 414. 1840, as synonym.
Neillia malvacea Greene, Pittonia **2**: 30. 1889.

Rocky canyons and mountain sides of the artemisia belt, upward to the spruce belt. Montana to Utah, westward to British Columbia, Nevada, and Oregon.

2. Opulaster monogynus (Torr.) Kuntze, Rev. Gen. Pl. **2**: 949. 1891.
Spiraea monogyna Torr. Ann. Lyc. N. Y. **2**: 194. 1828.
Opulaster hapemanii Rydb. N. Amer. Fl. **22**: 244. 1908.
Aspen and spruce belts; perhaps confined to the Rocky Mountain region. Black Hills, South Dakota, to Wyoming, Texas, and New Mexico.

3. Opulaster alternans (Jones) Heller, Cat. N. Amer. Pl. ed. 2. 5. 1900.
Neillia opulifolia alternans Jones, Zoe **4**: 42. 1893.
Rocky canyons and slopes of artemisia, pinyon, and aspen belts. Utah and Nevada.

2. SPIRAEA L. SPIREA

Petals pink or rose-colored; sepals ovate, acute; inflorescence more or less rounded ..... **1. S. helleri.**
Petals commonly white; sepals triangular-acute; inflorescence flat-topped. **2. S. lucida.**

1. Spiraea helleri Rydb. N. Amer. Fl. **22**: 248. 1908.
Canyons and moist mountain sides, at 1,800 to 2,100 meters. California and western Nevada.

2. Spiraea lucida Dougl.; Hook. Fl. Bor. Amer. **1**: 172. 1834.
Aspen and spruce belts; Teton Basin, Idaho. Saskatchewan to Wyoming, Oregon, and British Columbia.

3. PETROPHYTUM Rydb.

Leaves spatulate, 5 to 12 mm. long, spreading; inflorescence commonly simple, densely racemose, 1 to 4 cm. long ..... **1. P. caespitosum.**
Leaves oblanceolate, 15 to 20 mm. long, ascending; inflorescence racemose-paniculate, 6 to 10 cm. long ..... **2. P. elatius.**

1. Petrophytum caespitosum (Nutt.) Rydb. Mem. N. Y. Bot. Gard. **1**: 206. 1900.
Spiraea caespitosa Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 418. 1840.
Forming dense colonies on rocks in the artemisia belt and upward to the spruce belt. South Dakota and Montana to New Mexico and California.

2. Petrophytum elatius (S. Wats.) Heller, Cat. N. Amer. Pl. ed. 2. 5. 1900.
Spiraea caespitosa elatior S. Wats. in King, Geol. Expl. 40th Par. **5**: 81. 1871.
Forming dense colonies on rocks in the artemisia belt and upward to the spruce belt; perhaps only a robust form of the preceding species. Utah and Arizona.

4. CHAMAEBATIARIA Maxim.

1. Chamaebatiaria millefolium (Torr.) Maxim. Act. Hort. Petrop. **6**: 225. 1879. FERNBUSH.
Spiraea millefolium Torr. U. S. Rep. Exp. Miss. Pacif. **4**: 83. 1857.
Chamaebatiaria glutinosa Rydb. N. Amer. Fl. **22**: 258. 1908.
Plains, canyons, and hillsides of the artemisia, pinyon, yellow pine, and aspen belts. Idaho and Oregon to Arizona and southern California.

5. SERICOTHECA Raf.

Leaf blades suborbicular or ovate, often doubly serrate, contracted at base, green and glabrate above, pubescent beneath ..... **1. S. discolor.**

Leaf blades cuneate, mostly obovate, serrate.

Leaves conspicuously glandular, glabrous to villous, green on both faces. **2. S. glabrescens.**

Leaves not conspicuously if at all glandular, silky above, grayish or white-tomentose beneath **3. S. dumosa.**

1. Sericotheca discolor (Pursh) Rydb. N. Amer. Fl. **22**: 262. 1908. OCEANSPRAY.

Spiraea discolor Pursh, Fl. Amer. Sept. 342. 1814.

Holodiscus ariaefolius Greene, Man. Bot. San Fran. Bay 113. 1893.

Spiraea boursieri Carr. Rev. Hort. **1859**: 520. *f. 108*. 1859.

Canyons and mountain sides of the Sierra Nevada. Montana to California.

Sericotheca boursieri, with smaller leaves and a simpler inflorescence, appears to be only a reduced form of *S. discolor*. Forms with leaves of the former and inflorescence of the latter occur in the Sierra Nevada, between Carson City and Reno.

2. Sericotheca glabrescens (Greenm.) Rydb. N. Amer. Fl. **22**: 265. 1908.

Spiraea discolor glabrescens Greenm. Erythea **7**: 116. 1899.

Sericotheca obovata Rydb. N. Amer. Fl. **22**: 264. 1908.

Canyons and mountain sides of the pinyon, yellow pine, and aspen belts. Oregon and northern California to Utah.

3. Sericotheca dumosa (Nutt.) Rydb. N. Amer. Fl. **22**: 263. 1908. ROCKSPIREA.

Spiraea dumosa Nutt.; Hook. Lond. Journ. Bot. **6**: 217. 1847.

Sericotheca concolor Rydb. N. Amer. Fl. **22**: 264. 1908.

Sericotheca microphylla Rydb. N. Amer. Fl. **22**: 264. 1908.

Canyons and mountain sides of the pinyon belt, upward to 3,000 meters. Wyoming to California and Mexico.

6. HORKELIA Cham. & Schlecht.

Plants not glandular, more or less villous; leaflets 4 to 6 pairs, cuneate-obovate, toothed toward apex. Petals cuneate, 5 mm. long. **1. H. pseudocapitata.**

Plants more or less glandular; leaflets 5 to 8 pairs, broadly cuneate-obovate, toothed toward apex.

Petals truncate, cuneate, 3 to 4 mm. long; plants 20 to 60 cm. high; stipules 10 to 20 mm. long **2. H. fusca.**

Petals emarginate, cuneate or obovate, 2 to 3 mm. long; plants 10 to 20 cm. high; stipules 10 mm. long or less **3. H. parviflora.**

1. Horkelia pseudocapitata Rydb.; Howell, Fl. Northw. Amer. **1**: 180. 1898.

Valleys and mountain sides upward to the spruce belt. Northern California and western Nevada.

2. Horkelia fusca Lindl. Bot. Reg. **23**: *pl. 1997*. 1837.

Meadows and valleys, upward to the aspen belt; Sierra Nevada. Oregon, Idaho, Nevada, and California.

3. Horkelia parviflora Nutt.; Hook. & Arn. Bot. Beechey Voy. 338. 1840.

Meadows and valleys, upward to the aspen belt; Sierra Nevada. Oregon, western Nevada, and California.

7. IVESIA Torr. & Gray

Leaflets few, 2 to 10 pairs, not crowded; petals yellow; stamens 5.

Stems nearly scapose, 10 cm. high or less. Leaflets silky, divided into linear segments; flowers mostly capitate; petals oblanceolate, 4 mm. long. **3. I. webberi.**

Stems leafy. Flowers cymose; petals spatulate, 2 to 3 mm. long; plants pubescent or hirsutulous.
Leaflets orbicular or obovate, 5 to 10 mm. long, the teeth rounded, not bristle-pointed ---- 8. I. baileyi.
Leaflets cuneate-flabelliform, 5 to 8 mm. long, the teeth oblong, bristle-pointed ---- 9. I. setosa.
Leaflets very numerous, 15 to 35 pairs, more or less crowded; petals yellow or white; stamens 5 to 20.
Plants 4 to 7 cm. high, scapose, hirsutulous. Leaflets 1 to 2 mm. long, divided into oval or obovate segments; stamens 5 to 10 ---- 7. I. pygmaea.
Plants 10 cm. high or more.
Stems leafy; petals orbicular to obovate, white; stamens 20.
Leaflets villous-hirsute, 2 to 3 mm. long, commonly simple, 2-ranked, densely crowded ---- 1. I. eremica.
Leaflets glabrous, 3 to 5 mm. long, divided into 2 to 4 oblong segments. 2. I. kingii.
Stems scapose or with few leaves; petals spatulate to oblanceolate, yellow; stamens 5.
Plants 30 cm. high or more, hirsute; leaflets 2 to 5 mm. long, divided into obovate-oblong lobes. Sepals 4 to 5 mm. long, exceeding the petals ---- 5. I. mutabilis.
Plants 10 to 25 cm. high; leaflets puberulent or glabrous, 2 to 5 mm. long, divided into obovate to linear lobes.
Calyx lobes 2 to 2.5 mm. long, equaling the spatulate petals. 4. I. utahensis.
Calyx lobes 5 mm. long, equaling the spatulate or oblanceolate petals. 6. I. gordonii.

1. **Ivesia eremica** (Coville) Rydb. N. Amer. Fl. **22**: 286. 1908.
Potentilla eremica Coville. Proc. Biol. Soc. Washington **7**: 76. 1898.
Covillea belt; Ash Meadows, Nevada.

2. **Ivesia kingii** S. Wats. in King, Geol. Expl. 40th Par. **5**: 91. 1871.
Meadows and alkaline areas of the artemisia belt. Western Utah and Nevada.

3. **Ivesia webberi** A. Gray, Proc. Amer. Acad. **10**: 71. 1874.
Valleys and ravines, at 1,500 meters or more; Sierra Nevada. California and western Nevada.

4. **Ivesia utahensis** S. Wats. Proc. Amer. Acad. **17**: 371. 1882.
Spruce and alpine belts. Utah.

5. **Ivesia mutabilis** (T. S. Brandeg.) Rydb. N. Amer. Fl. **22**: 288. 1908.
Horkelia mutabilis T. S. Brandeg. Bot. Gaz. **27**: 446. 1899.
Pinyon belt. Southern Nevada, Utah, and northwestern Arizona.

6. **Ivesia gordonii** (Hook.) Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **6**: 72. 1857.
Horkelia gordonii Hook. Journ. Bot. Kew Misc. **5**: 341. *pl. 12.* 1853.
Aspen, spruce, and alpine belts. Montana to Washington, southward to Colorado and California.

7. **Ivesia pygmaea** A. Gray, Proc. Amer. Acad. **6**: 531. 1865.
Spruce and alpine belts. California and western Nevada.

8. **Ivesia baileyi** S. Wats. in King, Geol. Expl. 40th Par. **5**: 90. 1871.
On cliffs at 2,100 meters. Oregon and Nevada.

9. Ivesia setosa (S. Wats.) Rydb. N. Amer. Fl. **22**: 290. 1908.
Ivesia baileyi setosa S. Wats. in King, Geol. Expl. 40th Par. **5**: 91. 1871.
Pinyon belt, upward to 3,100 meters. Nevada.

8. PURPUSIA T. S. Brandeg.

1. Purpusia saxosa T. S. Brandeg. Bot. Gaz. **27**: 447. 1899.
In crevices of rocks at 1,200 to 1,500 meters. Southeastern California and southwestern Nevada.

9. COMARELLA Rydb.

1. Comarella sabulosa (Jones) Rydb. Mem. Bot. Columb. Coll. **2**: 157. *pl. 97.* 1898.
Potentilla sabulosa Jones, Proc. Calif. Acad. II. **5**: 680. 1895.
Head of Sevier River, "among pines," at 2,400 meters. Utah.

10. POTENTILLA L. Cinquefoil

Inflorescence very leafy; pubescent or glandular annuals, biennials, or short-lived perennials.
Leaves (at least the lower) pinnate.
All leaves pinnate, with 3 to 5 pairs of pinnae; achenes gibbous. **1. P. paradoxa.**
Stem leaves ternate; achenes not gibbous—**2. P. rivalis.**
Leaves digitate (basal leaves in No. 5 sometimes pinnate).
Petals equaling the sepals or nearly so; fruiting calyx 6 to 7 mm. long; achenes rugulose—**5. P. monspeliensis.**
Petals about one-half as long as the sepals; fruiting calyx 5 mm. long or less; achenes smooth.
Plants with slender spreading branches; leaflets cuneate-oblong. **3. P. millegrana.**
Plants with erect or ascending branches; leaflets broadly cuneate-obovate—**4. P. biennis.**
Inflorescence bracted or with only few leaves; perennials with rootstocks.
Basal leaves pinnate to bipinnatifid.
Leaflets orbicular or nearly so. Low glandular plant; basal leaves with 1 to 3 pinnae, the lobes obtuse—**31. P. brevifolia.**
Leaflets oblong or obovate.
Leaflets (11 to 13), 3 to 5-toothed above the middle, cuneate and entire below.
Leaflets about 10 mm. long. Plant 10 cm. high or less. **39. P. decurrens.**
Leaflets 15 to 25 mm. long.
Stem and mature leaves glabrate—**38. P. nelsoniana.**
Stem and mature leaves silky—**41. P. crinita.**
Leaflets toothed or cleft nearly from base to apex.
Leaflets toothed or cleft only halfway to mid-rib or less, more or less silvery-pubescent or tomentose.
Stems 10 cm. high or less; leaflets obovate, 1 cm. long, grayish-strigose above, tomentose beneath—**33. P. proxima.**
Stems 15 cm. high or more; leaflets oblanceolate to obovate, green, glabrous or silky above, tomentose beneath.
Leaflets not crowded, the upper pairs decurrent on the rachis. **34. P. propinqua.**

Leaflets crowded on a short rachis, the upper pairs not decurrent_____35. P. pulcherrima.
Leaflets cleft nearly to midrib.
Style filiform, longer than the mature achene; petals exceeding the sepals.
Leaflets more or less tomentose, at least beneath. Plants commonly less than 15 cm. high.
Leaflets more or less verticillate, cuneate-obovate, 3 to 5-lobed. 36. P. breweri.
Leaflets not verticillate, obovate, 5 to 11-lobed. 32. P. saximontana.
Leaflets green on both faces, or at most silky-strigose, not tomentose.
Leaflets more or less crowded, toothed or deeply cleft; stems commonly 10 cm. high or less_____40. P. ovina.
Leaflets not crowded, divided nearly to midrib into linear lobes; stems 10 to 20 cm. high.
Upper leaflets of basal leaves 15 mm. long or more, the lobes about 10 mm. long_____22. P. multisecta.
Upper leaflets of basal leaves commonly 12 mm. long or less, the lobes 5 to 8 mm. long.
Leaflets few_____21. P. perdissecta.
Leaflets 9 to 17_____37. P. plattensis.
Style thickened and glandular below, not longer than the mature achene; petals commonly equaling the sepals.
Leaflets crowded on a short rachis; plants low, grayish-silky or tomentose_____42. P. pseudosericea.
Leaflets not at all crowded; plants 30 to 40 cm. high. 43. P. strigosa.
Basal leaves 3-foliolate or digitate.
Basal leaves normally 3-foliolate (rarely 5-foliolate). Petals exceeding the sepals.
Leaflets green on both faces, cuneate-obovate, 1 to 2 cm. long; stems 20 to 30 cm. high_____30. P. flabellifolia.
Leaflets green above, grayish or white-tomentose beneath; plants low.
Petals 3 to 4 mm. long_____28. P. modesta.
Petals 6 to 8 mm. long_____29. P. nivea.
Basal leaves 5 to 9-foliolate (rarely 3-foliolate).
Leaflets more or less deeply cleft.
Plants more or less cespitose, 5 to 20 cm. high.
Leaves green on both faces, glabrate in age. Petals 5 to 8 mm. long. 21. P. perdissecta.
Leaves more or less densely silky or tomentose, at least beneath.
Upper leaflet of basal leaves with linear-oblong lobes, 10 mm. long or more_____22. P. multisecta.
Upper leaflet of basal leaves with short lobes.
Leaflets silky-strigose beneath; petals 6 to 7 mm. long. 19. P. diversifolia.
Leaflets white-tomentose beneath; petals about 5 mm. long.
Leaves grayish above; sepals ovate_____26. P. divisa.
Leaves green above; sepals lanceolate__27. P. quinquefolia.
Plants not cespitose, 30 to 80 cm. high (rarely under 30 cm.); petals exceeding the sepals.

Leaflets of basal leaves commonly 6 cm. long or more, obovate, tomentose beneath ---------- 13. P. blaschkeana.
Leaflets of basal leaves commonly less than 5 cm. long.
Lobes of leaflets narrowly linear, about 2 mm. broad, 5 to 20 mm. long ---------- 14. P. flabelliformis.
Lobes of leaflets linear-oblong, 3 to 10 mm. long.
Leaves green-silky beneath, not tomentose. 12. P. pectinisecta.
Leaves silky and tomentose beneath.
Pubescence of stem and petioles spreading--11. P. bakeri.
Pubescence of stem and petioles more or less appressed.
Stem strict, 40 cm. high or more---------- 17. P. dichroa.
Stem decumbent, rarely over 30 cm. high--10. P. candida.
Leaflets toothed, or cleft only halfway to midrib.
Plants 10 to 20 cm. high, more or less cespitose. Leaflets 1 to 2 cm. long; petals exceeding the sepals.
Leaflets white-tomentose beneath---------- 24. P. concinna.
Leaflets grayish-silky beneath---------- 25. P. concinnaeformis.
Plants 30 cm. high or more, commonly not at all cespitose.
Calyx and leaves distinctly glandular-atomiferous. Leaflets prominently veined, oblanceolate, 5 to 10 cm. long---- 6. P. nuttallii.
Calyx and leaves not glandular, or only sparingly so.
Leaflets commonly 7 cm. long or more, green on both faces, sparingly silky or tomentulose, distinctly veined. 7. P. grosseserrata.
Leaflets commonly 5 cm. long or less, not very distinctly veined.
Leaflets glabrate to sparingly silky, not tomentose.
Petals scarcely exceeding the (4 to 5 mm. long) sepals.
Leaflets silky-strigose beneath---------- 8. P. etomentosa.
Petals 7 to 10 mm. long, distinctly longer than the sepals.
Leaflets oblanceolate to obovate, toothed to near base. 9. P. jucunda.
Leaflets cuneate-obovate, entire toward base, toothed above. 20. P. glaucophylla.
Leaflets more or less tomentose beneath.
Leaflets cuneate-obovate, entire below, toothed above. 15. P. intermittens.
Leaflets oblanceolate to obovate, toothed to near base.
Leaflets green and sparingly strigose above; petals exceeding the sepals---------- 18. P. filipes.
Leaflets more or less densely silky above; petals scarcely exceeding the sepals.
Plants 40 to 80 cm. high; petioles of basal leaves 10 to 20 cm. long---------- 16. P. glomerata.
Plants rarely over 30 cm. high; petioles of basal leaves commonly less than 10 cm. long--23. P. fastigiata.

1. **Potentilla paradoxa** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 437. 1840.

Wet ground of the Covillea, artemisia, and pinyon belts. New York to Washington, southward to New Mexico and Mexico.

2. **Potentilla rivalis** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 437. 1840.

Wet ground and along rivers of the Covillea, artemisia, and pinyon belts. Saskatchewan to British Columbia and Mexico.

3. Potentilla millegrana Engelm.; Lehm. Delect. Sem. Hort. Hamb. **1849**: 11. 1849.

Meadows and near watercourses, upward to 2,200 meters. Manitoba to Washington, southward to Illinois, New Mexico, and California.

4. Potentilla biennis Greene, Fl. Franc. 65. 1891.

Alkali flats and moist ground, upward to 2,200 meters. Saskatchewan to British Columbia, southward to Colorado, Arizona, and Lower California.

5. Potentilla monspeliensis L. Sp. Pl. 499. 1753.

Waste places, canyons and hillsides, upward to 3,000 meters. Labrador to District of Columbia, California, and Alaska; also in Europe and Asia.

6. Potentilla nuttallii Lehm. Nov. Stirp. Pugill **9**: 44. 1851.

Canyons and mountain sides of the artemisia belt, upward to the spruce belt. Saskatchewan to Colorado, westward to British Columbia and Oregon.

7. Potentilla grosseserrata Rydb. N. Amer. Fl. **22**: 312. 1908.

Ruby Valley at 1,800 meters; about Lake Tahoe. Washington to northern Nevada and northern California.

8. Potentilla etomentosa Rydb. Bull. Torrey Club **24**: 8. 1897.

Canyons and mountain sides at 2,100 to 2,800 meters; Sierra Nevada. California and western Nevada.

9. Potentilla jucunda A. Nels. Bull. Torrey Club **27**: 32. 1900.

Aspen and spruce belts; Uintah Mountains, Utah. Montana to Colorado and Utah.

10. Potentilla candida Rydb. Bull. Torrey Club **24**: 6. 1897.

Potentilla pecten Rydb. N. Amer. Fl. **22**: 315. 1908.

Artemisia and pinyon belts. Nevada and Utah.

11. Potentilla bakeri Rydb. Bull. Torrey Club **31**: 560. 1904.

Meadows, canyons, and mountain sides of the pinyon, aspen, and spruce belts. Wyoming and Colorado to California.

12. Potentilla pectinisecta Rydb. Bull. Torrey Club **24**: 7. 1897.

Grassy lowlands and slopes of the artemisia, pinyon, yellow pine, and aspen belts. Wyoming to Nevada and Arizona.

13. Potentilla blaschkeana Turcz.; Lehm. Hamb. Gart. Zeit. **9**: 506. 1853.

Aspen and spruce belts. British Columbia to Wyoming, northern Nevada, and California.

14. Potentilla flabelliformis Lehm. Nov. Stirp. Pugill. **2**: 12. 1830.

Meadows and hillsides of the artemisia and pinyon belts. Saskatchewan to British Columbia, southward to Wyoming and northern Nevada.

15. Potentilla intermittens Rydb. N. Amer. Fl. **22**: 318. 1908.

Aspen and spruce belts. Alberta to Colorado and Nevada.

16. Potentilla glomerata A. Nels. Bull. Torrey Club **26**: 480. 1899.

Aspen and spruce belts. Montana to Washington, southward to Wyoming, Nevada, and California.

17. Potentilla dichroa Rydb. N. Amer. Fl. **22**: 319. 1908.

Grassy slopes of the aspen belt. Western Montana to Oregon, Utah, and Nevada.

18. Potentilla filipes Rydb. Bull. Torrey Club **28**: 174. 1901.

Aspen, spruce, and subalpine belts. Manitoba to Alberta, Utah, and New Mexico.

19. Potentilla diversifolia Lehm. Nov. Stirp. Pugill. **2:** 9. 1830.

Aspen, spruce, and alpine belts. Saskatchewan to British Columbia, southward to Colorado and California.

20. Potentilla glaucophylla Lehm. Delect. Sem. Hort. Hamb. **1836:** 7. 1836.

Aspen, spruce, and alpine belts. Saskatchewan to British Columbia, southward to New Mexico and Nevada.

21. Potentilla perdissecta Rydb. N. Amer. Fl. **22:** 327. 1908.

Aspen, spruce, and alpine belts. Alberta and British Columbia, southward to Wyoming and Utah.

22. Potentilla multisecta (S. Wats.) Rydb. Bull. Torrey Club **23:** 397. 1896.

Potentilla diversifolia multisecta S. Wats. in King, Geol. Expl. 40th Par. **5:** 86. 1871.

Spruce and subalpine belts; East Humboldt Mountains. Montana and British Columbia, southward to Wyoming and Nevada.

23. Potentilla fastigiata Nutt.; Torr. & Gray, Fl. N. Amer. **1:** 440. 1840.

Meadows of the aspen belt. Montana, Wyoming, Utah, and Nevada.

24. Potentilla concinna Richards. Bot. App. Frankl. Journ. ed. 2. 20. 1823.

Aspen and spruce belts. Saskatchewan and Alberta, southward to Colorado and Utah.

25. Potentilla concinnaeformis Rydb. Mem. Bot. Columb. Coll. **2:** 54. *pl. 15.* 1898.

Aspen, spruce, and alpine belts. Arizona, central Utah, and Nevada.

26. Potentilla divisa Rydb. N. Amer. Fl. **22:** 330. 1908.

Dry rocky soil of the aspen, spruce, and alpine belts. Saskatchewan and Alberta, southward to Colorado and Utah.

27. Potentilla quinquefolia Rydb. Mem. Bot. Columb. Coll. **2:** 76. *pl. 30.* 1898.

Spruce and alpine belts. Saskatchewan to British Columbia, southward to Colorado and Utah.

28. Potentilla modesta Rydb. N. Amer. Fl. **22:** 331. 1908.

Alpine belt. Utah and eastern Nevada.

29. Potentilla nivea L. Sp. Pl. 499. 1753.

Potentilla nipharga Rydb. N. Amer. Fl. **22:** 332. 1908.

Alpine belt. Greenland to Alaska, southward to Quebec, Colorado, and Utah; also in Europe and Asia.

30. Potentilla flabellifolia Hook.; Torr. & Gray, Fl. N. Amer. **1:** 442. 1840.

Meadows of the aspen and spruce belts; Sierra Nevada. British Columbia to western Nevada and central California.

31. Potentilla brevifolia Nutt.; Torr. & Gray, Fl. N. Amer. **1:** 442. 1840.

Spruce and alpine belts. Oregon to northern Nevada and Wyoming.

32. Potentilla saximontana Rydb. Bull. Torrey Club **23:** 399. 1896.

Potentilla rubripes Rydb. Bull. Torrey Club **33.** 143. 1906.

Alpine belt. Alberta to Colorado and Utah.

33. Potentilla proxima Rydb. N. Amer. Fl. **22:** 339. 1908.

Spruce and alpine belts. Central Utah to Arizona.

34. Potentilla propinqua Rydb. Bull. Torrey Club **28:** 176. 1901.

Aspen and spruce belts. Alberta to South Dakota, New Mexico, and Arizona.

35. Potentilla pulcherrima Lehm. Nov. Stirp. Pugill. 2: 10. 1830.
Aspen and spruce belts. Saskatchewan and Alberta, southward to New Mexico and Nevada.

36. Potentilla breweri S. Wats. Proc. Amer. Acad. 8: 555. 1873.
Aspen and spruce belts; Sierra Nevada. California and western Nevada.

37. Potentilla plattensis Nutt.; Torr. & Gray, Fl. N. Amer. 1: 439. 1840.
Aspen and spruce belts. Saskatchewan to New Mexico and Utah.

38. Potentilla nelsoniana Rydb. N. Amer. Fl. 22: 344. 1908.
Aspen, spruce, and alpine belts. Wyoming, to northern Utah, and Colorado.

39. Potentilla decurrens (S. Wats.) Rydb. Bull. Torrey Club 23: 396. 1896.
Potentilla dissecta decurrens S. Wats. Proc. Amer. Acad. 8: 557. 1873.
Spruce and alpine belts. Utah.

40. Potentilla ovina J. M. Macoun, Can. Rec. Sci. 6: 464. 1896.
Potentilla diversifolia pinnatisecta S. Wats. in King, Geol. Expl. 40th Par. 5: 87. 1871.
Aspen, spruce, and alpine belts. Alberta to Wyoming and Nevada.

41. Potentilla crinita A. Gray, Mem. Amer. Acad. n. ser. 4: 41. 1849.
Yellow pine and aspen belts. Colorado, Utah, New Mexico, and Arizona.

42. Potentilla pseudosericea Rydb. Mem. Bot. Columb. Coll. 2: 98. *pl. 36.* 1898.
Potentilla paucijuga Rydb. N. Amer. Fl. 22: 348. 1908.
Aspen, spruce, and alpine belts. Wyoming and Colorado to Nevada.

43. Potentilla strigosa Pall.; Tratt. Rosac. Monogr. 4: 31. 1824.
Potentilla pennsylvanica strigosa Pursh, Fl. Amer. Sept. 356. 1814.
Plains and mountain sides, upward to the yellow pine belt. Hudson Bay to British Columbia, southward to Kansas and New Mexico; also in Asia.

11. ARGENTINA Lam. SILVERWEED

Leaves silvery on both faces ..... 1. A. argentea.
Leaves green and glabrous above ..... 2. A. anserina.

1. Argentina argentea Rydb. Bull. Torrey Club 33: 143. 1906.
Meadows and along creeks of the artemisia belt, upward to the spruce belt. Mackenzie to British Columbia, southward to New Mexico and Arizona.

2. Argentina anserina (L.) Rydb. Mem. Bot. Columb. Coll. 2: 159. 1898.
Potentilla anserina L. Sp. Pl. 495. 1753.
Meadows of the Great Basin. Introduced from Europe.

12. FRAGARIA L. STRAWBERRY

Leaflets sessile or nearly so; scapes usually with leafy bracts. Pubescence loose, villous; achenes superficial ..... 1. F. bracteata.
Leaflets (at least the middle one) petiolulate; scapes with small bracts.
Subtending bracts shorter and narrower than the sepals; achenes in pits. ..... 4. F. glauca.
Subtending bracts and sepals nearly alike; achenes superficial.
Petals obovate or nearly so, twice longer than the sepals; bracts and sepals lanceolate ..... 2. F. platypetala.
Petals obovate and one-half to one-third longer than the sepals; bracts and sepals ovate, obtuse or acute ..... 3. F. truncata.

1. Fragaria bracteata Heller, Bull. Torrey Club **25**: 194. 1898.

In canyons and aspen groves, upward to the spruce belt. Montana and British Columbia, southward to New Mexico and California.

2. Fragaria platypetala Rydb. Mem. Bot. Columb. Coll. **2**: 177. 1898.

Meadows and grassy slopes of the aspen and spruce belts. Alaska to Montana, Utah, and California.

3. Fragaria truncata Rydb. Mem. Bot. Columb. Coll. **2**: 177. 1898.

Aspen and yellow pine belts; Sierra Nevada. Idaho, western Nevada, and California.

4. Fragaria glauca (S. Wats.) Rydb. Mem. Bot. Columb. Coll. **2**: 183. 1898.

Fragaria virginiana glauca S. Wats. in King, Geol. Expl. 40th Par. **5**: 85. 1871.

Canyons of the aspen and spruce belts. British Columbia to Mackenzie, southward to Nevada and New Mexico.

13. SIBBALDIA L.

1. Sibbaldia procumbens L. Sp. Pl. 284. 1753.

Spruce and alpine belts. Arctic America to New Hampshire, Colorado, and California; also in Europe and Asia.

14. DASIPHORA Raf. SHRUBBY CINQUEFOIL

1. Dasiphora fruticosa (L.) Rydb. Mem. Bot. Columb. Coll. **2**: 188. 1898.

Potentilla fruticosa L. Sp. Pl. 495. 1753.

Canyons and mountain sides of the upper pinyon, yellow pine, aspen, and spruce belts. Labrador to Alaska, southward to New Jersey, New Mexico, and California; also in Europe and Asia.

15. DRYMOCALLIS Fourr.

Plant 15 cm. high or less, viscid-pubescent to glabrate. Leaflets broadly obovate or cuneate-flabelliform, about 1 cm. broad; petals 7 to 8 mm. long, exceeding the sepals ..... 6. D. pumila.

Plants 15 to 100 cm. high.

Petals much exceeding the sepals.

Stems few-leaved or nearly scapose, 20 to 40 cm. high; leaflets 1 to 2 cm. long, coarsely serrate, pilose to glabrate ..... 2. D. monticola.

Stems leafy throughout; leaflets mostly orbicular to obovate.

Sepals ovate-lanceolate, not long-pointed. Leaflets pubescent or glabrate, 3 to 6 cm. long, coarsely serrate ..... 4. D. valida.

Sepals lanceolate, acuminate.

Leaflets orbicular to rounded-obovate, incised or doubly serrate, glandular-hirsute or villous ..... 5. D. fissa.

Leaflets rhombic-obovate, sparingly pubescent to glandular-atomiferous ..... 3. D. foliosa.

Petals slightly exceeding, equaling, or shorter than the sepals. Plants 30 to 100 cm. high.

Plants glabrate to sparingly pubescent, rarely if ever glandular. Leaflets serrate or incised, the teeth ovate-lanceolate ..... 9. D. incisa.

Plants more or less glandular, viscid-villous, or pubescent.

Sepals ovate, rounded and mucronate, about 4 mm. long. Petals 2 to 3 mm. long; plants viscid-villous ..... 10. D. micropetala.

Sepals ovate-lanceolate or lanceolate, acute or acuminate.
Upper leaflets of basal leaves rhombic-ovate, coarsely serrate or incised, 3 to 5 cm. long. Plants 0.5 to 1 meter high, long-villous, glandular, or viscid; petals white_____1. **D. convallaria.**
Upper leaflets of the basal leaves obovate, obtuse. Petals yellow in anthesis.
Calyx glandular-hirsute, the bractlets linear-lanceolate; leaflets simply or doubly serrate, 1 to 3 cm. long___7. **D. glandulosa.**
Calyx viscid, short-villous, the bractlets oblong-lanceolate; leaflets mostly serrate, 1 to 2 cm. long_____8. **D. arizonica.**

1. **Drymocallis convallaria** Rydb. Mem. Bot. Columb. Coll. **2**: 193. *pl. 104.* 1898.
Potentilla convallaria Rydb. Bull. Torrey Club **24**: 249. 1897.
Meadows and moist canyons of the aspen belt. Montana and Idaho to New Mexico.

2. **Drymocallis monticola** Rydb. N. Amer. Fl. **22**: 370. 1908.
Potentilla glandulosa nevadensis S. Wats. Bot. Calif. **1**: 178. 1876. Not *P. nevadensis* Boiss. 1838.
Meadows and rocky places, 2,400 to 3,300 meters; Sierra Nevada. California and Nevada.

3. **Drymocallis foliosa** Rydb. N. Amer. Fl. **22**: 371. 1908.
Aspen and spruce belts. Montana to northeastern Utah and Colorado.

4. **Drymocallis valida** (Greene) Piper, Contr. U. S. Nat. Herb. **11**: 342. 1906.
Potentilla valida Greene, Pittonia **3**: 20, 1896.
Aspen and spruce belts. British Columbia and Washington to northern Utah and Nevada.

5. **Drymocallis fissa** (Nutt.) Rydb. Mem. Bot. Columb. Coll. **2**: 197. *pl. 106.* 1898.
Potentilla fissa Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 446. 1840.
Aspen, spruce, and subalpine belts. Alberta to Colorado and Utah.

6. **Drymocallis pumila** Rydb. N. Amer. Fl. **22**: 372. 1908.
Spruce and subalpine belts. Southeastern Oregon to Utah and California.

7. **Drymocallis glandulosa** (Lindl.) Rydb. Mem. Bot. Columb. Coll. **2**: 198. *pl. 107.* 1898.
Potentilla glandulosa Lindl. Bot. Reg. **19**: *pl. 1583.* 1833.
Aspen and spruce belts. South Dakota to British Columbia, southward to New Mexico and California.

8. **Drymocallis arizonica** Rydb. N. Amer. Fl. **22**: 373. 1908.
Pinyon belt. Arizona and southern Utah.

9. **Drymocallis incisa** (Lindl.) Rydb. N. Amer. Fl. **22**: 374. 1908.
Potentilla incisa Lindl. Bot. Reg. **23**: *pl. 1973.* 1837.
Yellow pine belt. Washington, Idaho, Nevada, and California.

10. **Drymocallis micropetala** Rydb. N. Amer. Fl. **22**: 375. 1908.
Canyons of the aspen belt. Utah to Idaho.

16. CHAMAERHODOS Bunge

1. **Chamaerhodos nuttallii** (Torr. & Gray) Pickering; Rydb. N. Amer. Fl. **22**: 377. 1908.
Chamaerhodos erecta nuttallii Torr. & Gray, Fl. N. Amer. **1**: 433. 1840.
Spruce belt; mountains near Marysvale, Utah. Saskatchewan to Alaska southward to South Dakota, Colorado, and Utah.

17. AGRIMONIA L. Agrimony

Lower series of bristles on fruiting calyx reflexed; principal leaflets 5 to 9, with numerous small intervening ones ..... 1. A. gryposepala.
Lower series of bristles on fruiting calyx erect or nearly so; principal leaflets 7 to 13, with numerous small ones ..... 2. A. striata.

1. Agrimonia gryposepala Wallr. Beitr. Bot. 1: 49. 1842.

Mountain meadows and moist forests. Nova Scotia to North Dakota, New Mexico, and California. Perhaps outside our range.

2. Agrimonia striata Michx. Fl. Bor. Amer. 1: 287. 1803.

Mountain meadows and moist forests. Nova Scotia to British Columbia, southward to West Virginia, New Mexico, and Arizona. Perhaps not in our range.

18. COLEOGYNE Torr. Blackbush

1. Coleogyne ramosissima Torr. Pl. Frém. 8. 1853.

Plateaus and mountain sides of the artemisia and pinyon belts, forming dense colonies above the Covillea belt. Southwestern Colorado, Arizona, Nevada, and California.

19. DRYAS L. Dryad

1. Dryas octopetala L. Sp. Pl. 501. 1753.

Alpine belts; Uintah Mountains, Utah. Arctic America to Colorado and Utah; also in Europe and Asia.

20. GEUM L. Avens

Petals flesh-colored, purple-veined. Calyx purple ..... 3. G. rivale.
Petals yellow.
Upper internode of style glabrous or hispidulous; terminal leaflet usually cuneate-obovate ..... 1. G. strictum.
Upper internode of style hirsute; terminal leaflet usually reniform or rounded ..... 2. G. oregonense.

1. Geum strictum Ait. Hort. Kew. 2: 217. 1789.

Canyons and mountain sides of the aspen and spruce belts. Newfoundland to British Columbia, Arizona, and Mexico.

2. Geum oregonense (Scheutz) Rydb. Bull. Torrey Club 25: 56. 1898.

Geum urbanum oregonense Scheutz, Nov. Act. Soc. Sci. Upsal. III. 7: 26. 1870.

Canyons and mountain sides of the aspen and spruce belts. Mackenzie to British Columbia, Minnesota, New Mexico, and California.

3. Geum rivale L. Sp. Pl. 501. 1753.

Moist meadows of the aspen and spruce belts. Labrador to British Columbia, southward to New Jersey and New Mexico; also in Europe and Asia.

21. SIEVERSIA Willd.

Styles glabrous, not elongating in fruit; leaflets cuneate-obovate to oblanceolate, toothed, 3-cleft or entire. Bractlets lanceolate, equaling or shorter than the calyx lobes.
Leaves silky; petals orbicular; achenes villous ..... 1. S. sericea.
Leaves glabrate to puberulent, not silky; petals obovate; achenes strigose. 2. S. turbinata.

Styles more or less plumose, elongating in fruit; leaflets cuneate to obovate, toothed or 3 to 5-cleft.
Bractlets longer than the calyx lobes; leaflets cleft halfway to rachis or more; style in fruit about 3 cm. long ..... 3. S. ciliata.
Bractlets equaling or shorter than the calyx lobes; leaflets 3 to 5-toothed, 1 to 2 cm. long; style in fruit 2.5 to 3 cm. long.
Bractlets linear, equaling the calyx lobes; petals elliptic or spatulate-oblong ..... 4. S. grisea.
Bractlets linear-oblong or lanceolate, shorter than the calyx lobes; petals elliptic or elliptic-obovate ..... 5. S. canescens.

1. **Sieversia sericea** Greene, Pittonia 4: 50. 1899.
Acomastylis sericea Greene, Leaflets 1: 174. 1906.
Aspen and spruce belts. Montana, Wyoming, Idaho, and Nevada.

2. **Sieversia turbinata** (Rydb.) Greene, Pittonia 4: 50. 1899.
Geum turbinatum Rydb. Bull. Torrey Club 24: 91. 1897.
Acomastylis turbinata Greene, Leaflets 1: 174. 1906.
Spruce and alpine belts. Montana to New Mexico, Arizona, and Nevada.

3. **Sieversia ciliata** (Pursh) Don, Hist. Dichl. Pl. 2: 528. 1832.
Geum ciliatum Pursh, Fl. Amer. Sept. 352. 1814.
Spruce and subalpine belts. Alberta and British Columbia, southward to New Mexico and Utah.

OLD-MANS-WHISKERS.

4. **Sieversia grisea** (Greene) Rydb. N. Amer. Fl. 22: 409. 1913.
Erythrocoma grisea Greene, Leaflets 1: 178. 1906.
Aspen and spruce belts. Montana to Washington and Mexico.

5. **Sieversia canescens** (Greene) Rydb. N. Amer. Fl. 22: 409. 1913.
Erythrocoma canescens Greene, Leaflets 1: 178. 1906.
Aspen belt. Idaho and Washington, southward to western Nevada and California.

22. FALLUGIA Endl. APACHE-PLUME

1. **Fallugia paradoxa** (Don) Endl. Gen. Pl. 1246. 1840.
Sieversia paradoxa Don, Trans. Linn. Soc. Bot. 15: 576. *pl. 22, f. 7–10.* 1825.
Canyons and hillsides of the Covillea, artemisia, and lower pinyon belts. Colorado to Nevada, Arizona, Texas, and Mexico.

23. COWANIA D. Don. CLIFFROSE

1. **Cowania stansburiana** Torr. in Stansb. Expl. Great Salt Lake 386. 1852.
Cowania alba Goodding, Bot. Gaz. 37: 55. 1904.
Artemisia and pinyon belts. Southern Colorado to Nevada, southern California, and Mexico.

24. PURSHIA DC. ANTELOPE-BRUSH

Leaves pubescent above, tomentose beneath, scarcely or not at all glandular-dotted ..... 1. P. tridentata.
Leaves glabrous or nearly so, impressed glandular-dotted ..... 2. P. glandulosa.

1. **Purshia tridentata** (Pursh) DC. Trans. Linn. Soc. 12: 158. 1817.
Tigarea tridentata Pursh, Fl. Amer. Sept. 333. 1814.
Canyons and slopes of the pinyon, yellow pine, and aspen belts. Montana and Washington to New Mexico and California.

2. Purshia glandulosa Curran, Bull. Calif. Acad. **1**: 153. 1885.

Canyons and slopes of the artemisia and pinyon belts. Southern Nevada and southern California.

25. CERCOCARPUS H. B. K. MOUNTAIN-MAHOGANY

Leaves toothed, broadly ovate to obovate, 1 to 3 cm. long, sparingly silky above, tomentose beneath. Shrub, 1 to 2 meters high (rarely more) **1. C. montanus.**

Leaves entire, linear to elliptic, revolute.

Leaf blades elliptic to lanceolate, slightly revolute, 1.5 to 3 cm. long, glabrous above (in age), tomentose beneath; shrub or small tree. **2. C. ledifolius.**

Leaf blades strongly revolute, appearing linear, 5 to 15 mm. long; shrubs.

Leaves glabrous or nearly so—**3. C. intricatus.**

Leaves short-villous—**4. C. arizonicus.**

1. Cercocarpus montanus Raf. Atl. Journ. 146. 1832.

Cercocarpus parvifolius Nutt.; Hook. & Arn. Bot. Beechey Voy. 337. 1840.

Cercocarpus flabellifolius Rydb. N. Amer. Fl. **22**: 422. 1913.

Canyons and hillsides of the artemisia, pinyon, yellow pine, and aspen belts. South Dakota to western Kansas, westward to Montana, Nevada, and Arizona.

2. Cercocarpus ledifolius Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 427. 1840.

Upper pinyon, yellow pine, and aspen belts. Montana to Washington, southward to Colorado and southern California.

In central Nevada this tree largely replaces the yellow pine and aspen in the middle mountain belt. It here forms a conspicuous belt between the pinyon and the white pine colonies.

3. Cercocarpus intricatus S. Wats. Proc. Amer. Acad. **10**: 346. 1875.

Canyons and mountain sides of the artemisia and pinyon belts. Utah, Nevada, Arizona, and southern California. This intergrades with the preceding species.

4. Cercocarpus arizonicus Jones, Zoe **2**: 14. 1891.

Canyons and mountain sides of the artemisia and pinyon belts. Utah, Nevada, and Arizona. Perhaps only a form of the preceding species, having short-villous leaves and somewhat shorter achenes.

26. RUBUS L.

Leaves simple; petals 1 to 3 cm. long, exceeding the sepals. Fruit red, 1.5 to 2 cm. in diameter—**1. R. parviflorus.**

Leaves compound; petals equaling or shorter than the sepals.

Leaves on floral branches (at least some of them) pinnately 5-foliolate, green and glabrous above, white-tomentose beneath. Fruit 10 to 12 mm. in diameter—**3. R. arizonicus.**

Leaves on floral branches 3-foliolate, green above, white or grayish-tomentose beneath.

Lower leaves mostly palmately 5-foliolate; fruit dark reddish purple; prickles recurved; inflorescence, petioles, and stems not glandular. **2. R. leucodermis.**

Leaves pinnately 3 or 5-foliolate; prickles or bristles straight; inflorescence, petioles, and young stems densely glandular—**4. R. melanolasius.**

1. Rubus parviflorus Nutt. Gen. Pl. **1**: 308. 1818.

WHITEFLOWERING RASPBERRY.

Rubacer parviflorum Rydb. Bull. Torrey Club **30**: 274. 1903.

Canyons and wooded slopes of the aspen and spruce belts. Western Ontario to Alaska, southward to Michigan and California.

2. Rubus leucodermis Dougl.; Torr. &. Gray. Fl. N. Amer. **1**: 454. 1840.

WHITEBARK RASPBERRY.

Canyons and along creeks of the pinyon, yellow pine, and aspen belts. Montana to British Columbia, southward to Utah and California.

3. Rubus arizonicus (Greene) Rydb. N. Amer. Fl. **22**: 446. 1913.

Batidaea arizonica Greene, Leaflets **1**: 243. 1906.

Canyons and slopes of the yellow pine, aspen, and spruce belts; Kaibab Plateau. Arizona and New Mexico to Mexico.

4. Rubus melanolasius Focke, Abh. Naturw. Ver. Bremen **13**: 469. 1896.

WESTERN RED RASPBERRY.

Rubus strigosus Auct., not Michx.

Rubus acalyphaceus Rydb. N. Amer. Fl. **22**: 448. 1913.

Aspen and spruce belts. Alberta and British Columbia, southward to Colorado, Nevada, and Oregon. *Rubus acalyphaceus* appears to be a less densely tomentose or puberulent form.

27. ROSA L. ROSE

Hypanthium and fruit densely prickly. Leaves glabrous or nearly so; fruit 12 to 18 mm. in diameter----------1. R. macdougalii.

Hypanthium and fruit not prickly, or only sparingly so.

Styles and sepals deciduous. Stipules glandular-ciliate; leaflets suborbicular to elliptic, glabrous, doubly serrate, the teeth gland-tipped; flowers solitary; sepals glabrous on the back; fruit globose----17. R. gymnocarpa.

Styles and sepals persistent.

Hypanthium pyriform, 10 to 12 mm. in diameter, with a distinct neck. Leaflets puberulent, glabrous, or glandular beneath; sepals glandular on the back----------16. R. pyrifera.

Hypanthium globose-obovoid or ellipsoid, without a distinct neck (except in No. 11).

Flowers mostly solitary.

Infrastipular prickles straight or nearly so. Sepals glabrous or sparingly pubescent on the back, the margin tomentose.

Petals about 1 cm. long; leaflets oval to suborbicular. 12. R. rotundata.

Petals 2 to 3 cm. long; leaflets oval or elliptic. Fruit 12 to 18 mm. in diameter----------2. R. spaldingii.

Infrastipular prickles curved.

Sepals with glandular margin, the back glabrous. Leaflets glabrous or nearly so, oval or obovate; fruit pyriform----3. R. melina.

Sepals with tomentose margin, the back glabrous, pubescent, or glandular.

Leaflets perfectly glabrous, oval or obovate, the teeth glandular. Stipules glandular-denticulate; sepals glabrous or sparingly glandular----------8. R. manca.

Leaflets pubescent or glandular, at least beneath.

Sepals glandular on the back; leaflets puberulent and glandular beneath. Fruit ellipsoid, 15 mm. long----7. R. granulifera.

Sepals glabrous or pubescent on the back; leaflets sparingly pubescent beneath----------4. R. oreophila.

Flowers mostly corymbose.

Infrastipular prickles curved. Sepals pubescent or glabrous on the back.

Petioles and rachis pubescent, not glandular; fruit globose, 10 to 12 mm. in diameter----------6. R. puberulenta.

Petioles and rachis pubescent and glandular; fruit ellipsoid, 15 mm. long----------5. R. neomexicana.

Infrastipular prickles straight (often slightly curved in No. 11).

Leaflets oval-oblong, thin, commonly over 4 cm. long. Sepals glabrous on the back, the margin tomentose; fruit 10 mm. in diameter; stems nearly unarmed----------13. R. salictorum.

Leaflets obovate to broadly oval, commonly less than 3 cm. long.

Leaflets glabrous. Sepals glabrous or slightly glandular.

Stipules glandular-ciliate; fruit orange----10. R. chrysocarpa.

Stipules not glandular-ciliate; fruit purplish----11. R. woodsii.

Leaflets pubescent or glandular (at least beneath).

Petioles and rachis conspicuously glandular-puberulent; sepals sparingly glandular on the back; fruit 8 to 10 mm. in diameter----------9. R. fendleri.

Petioles and rachis puberulent but not conspicuously glandular; sepals glabrous or puberulent on the back.

Leaflets narrowly oval; petals about 15 mm. long.

14. R. ultramontana.

Leaflets obovate; petals about 20 mm. long--15. R. macounii.

1. Rosa macdougalii Holzinger, Bot. Gaz. **21**: 36. 1896.

Valleys and along watercourses; Idaho. British Columbia and Montana to northern Utah (?).

2. Rosa spaldingii Crépin, Bull. Soc. Bot. Belg. **15**: 42. 1876.

Canyons and wooded slopes, upward to the subalpine belt. British Columbia to Wyoming, northern Utah, and California.

3. Rosa melina Greene, Pittonia **4**: 10. 1899.

Aspen and spruce belts. Colorado and Utah.

4. Rosa oreophila Rydb. Bull. Torrey Club **31**: 561. 1904.

Rosa bakeri Rydb. Colo. Agri. Exp. Sta. Bull. **100**: 191. 1903.

Aspen belt; Uintah Mountains. Colorado and Utah.

5. Rosa neomexicana Cockerell, Ent. News **12**: 41. 1901.

Aspen and spruce belts. Southern Colorado and New Mexico to southern Nevada and Arizona.

6. Rosa puberulenta Rydb. Fl. Rocky Mount. 443. 1917.

Valley and slopes of the upper Covillea belt, upward to the aspen belt. Utah and Idaho to California and Washington.

7. Rosa granulifera Rydb. N. Amer. Fl. **22**: 517. 1918.

Pinyon belt; Charleston Mountains, Nevada. Western New Mexico to Southern Nevada.

8. Rosa manca Greene, Pittonia **4**: 11. 1899.

Aspen and spruce belts. Colorado, Utah, and northern Arizona.

9. Rosa fendleri Crépin, Bull. Soc. Bot. Belg. **15**: 91. 1876.

Artemisia, pinyon, yellow pine, and aspen belts. Minnesota to British Columbia, and northern Mexico.

10. Rosa chrysocarpa Rydb. Bull. Torrey Club **44**: 74. 1917.

Valleys and canyons, upward to the aspen belt. Utah and Idaho to California and Washington.

11. Rosa woodsii Lindl. Rosar. Monogr. 21. 1820.

Canyons and mountain sides, upward to the spruce belt. Saskatchewan to Kansas, westward to British Columbia and Nevada.

12. Rosa rotundata Rydb. Bull. Torrey Club **44**: 76. 1917.

Yellow pine and aspen belts; Sierra Nevada. Western Nevada and California.

13. Rosa salictorum Rydb. Bull. Torrey Club **44**: 77. 1917.

Along watercourses of the artemisia belt. Idaho and northern Nevada.

14. Rosa ultramontana (S. Wats.) Heller, Muhlenbergia **1**: 107. 1904.

Rosa californica ultramontana S. Wats. Bot. Calif. **1**: 187. 1876.

Canyons and along watercourses of the artemisia and pinyon belts. Montana to British Columbia, California, and Nevada.

15. Rosa macounii Greene, Pittonia **4**: 10. 1899.

Canyons of the pinyon and aspen belts. Saskatchewan to Colorado, Utah, and Washington.

16. Rosa pyrifera Rydb. Fl. Rocky Mount. 445. 1917.

Along water courses and in moist ravines at 1,800 meters. Montana and Wyoming, westward to Washington and California.

17. Rosa gymnocarpa Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 461. 1840.

Coniferous forests and open slopes at 1,200 meters, upward to the aspen belt. British Columbia to Idaho, Nevada, and central California.

59. MALACEAE. Apple Family

Shrubs or trees; leaves simple or compound, alternate, entire or toothed; flowers 5-merous, with numerous stamens; hypanthium adnate to the ovary, the latter 1 to 5-carpeled; styles 1 to 5; fruit a pome.

Leaves pinnate, the leaflets singly or doubly serrate. Flowers white, in compound cymes; hypanthium urceolate; ovary inferior; styles 3; fruit berry-like ..... 3. **SORBUS.**

Leaves simple.

Leaves narrowly oblanceolate, entire, 2 to 4 cm. long, pubescent. Flowers solitary or in umbels of 2 or 3; petals orbicular, pink; fruit glabrous, 15 to 18 mm. in diameter ..... 4. **PERAPHYLLUM.**

Leaves rhombic-oblanceolate to subrotund, more or less toothed. Styles 1 to 5; ovary inferior or nearly so.

Flowers racemose; petals white; unarmed shrubs ..... 1. **AMELANCHIER.**

Flowers in corymbiform cymes; petals white or pink; shrubs or small trees, armed with thorns ..... 2. **CRATAEGUS.**

1. AMELANCHIER Medic. SHADBLOW

Top of ovary, calyx lobes, and leaves glabrous.

Leaves vivid green, shining, oval to elliptic, rounded or acute, entire, few-toothed, or serrulate (at least above). Styles 3 ..... 5. **A. nitens.**

Leaves pale green, not shining, more or less glaucous, at least beneath, toothed.

Leaves toothed to near base. Petals oblong to obovate-oblong, 10 mm. long or more.

Leaves broadly elliptic-oval, the teeth 3 to 4 mm. long_____1. **A. pumila.**
Leaves subrotund, the teeth about 2 mm. long, the base rounded or subcordate_____2. **A. glabra.**
Leaves toothed to near middle, entire below, obovate to elliptic or subrotund.
Petals obovate-oblong, 5 to 6 mm. long; leaves 12 to 20 mm. long.
3. A. covillei.
Petals obovate-oblong, 10 mm. long or more; leaves 2 to 4 cm. long.
Fruit dark-purple, 8 to 9 mm. long_____4. **A. polycarpa.**
Top of ovary, calyx lobes, and leaves (at least when young) pubescent.
Styles 4 or 5; fruit glabrous, purple at maturity. Leaves mostly toothed above the middle; twigs brown.
Leaves glabrous above, floccose or tomentose beneath, at least when young, elliptic to subrotund, 2 to 5 cm. long, the teeth prominent; petals oblanceolate, 10 to 15 mm. long_____6. **A. alnifolia.**
Leaves more or less pubescent on both faces, elliptic to obovate, 2 to 4 cm. long, small-toothed; petals spatulate to oblanceolate, 8 mm. long.
7. A. oreophila.
Styles 2 or 3; fruit more or less pubescent, mostly orange or yellow.
Leaves coarsely serrate, oval to subrotund, grayish green to white-tomentulose beneath, 1 to 3 cm, long. Petals elliptic, about 7 mm. long_____8. **A. utahensis.**
Leaves finely serrate to nearly entire, 1 to 3 cm. long, tomentulose beneath, pubescent above.
Leaves ovate, often toothed to near base; petals obovate to oblong.
9. A. rubescens.
Leaves oblong to obovate, mostly toothed near apex; petals elliptic.
10. A. pallida.

1. **Amelanchier pumila** Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 474. 1840.
Aspen belt. Wyoming, Colorado, and Utah(?)

2. **Amelanchier glabra** Greene, Fl. Franc. 52. 1891.
Aspen belt; Sierra Nevada. California and western Nevada(?)

3. **Amelanchier covillei** Standl. Proc. Biol. Soc. Washington **27**: 198. 1914.
Aspen belt; Toiyabe Mountains. Southeastern California and southern Nevada.

4. **Amelanchier polycarpa** Greene, Pittonia **4**: 127. 1900.
Aspen belt. Wyoming to New Mexico and Utah.

5. **Amelanchier nitens** Tidestrom, Proc. Biol. Soc. Washington **36**: 182. 1923.
Pinyon belt; Charleston Mountains, Nevada.

6. **Amelanchier alnifolia** Nutt.; Journ. Acad. Phila. **7**: 22. 1834.
Aronia alnifolia Nutt. Gen. Pl. **1**: 306. 1818.
Canyons and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Saskatchewan to Alaska, southward to Colorado and California.

7. **Amelanchier oreophila** A. Nels. Bot. Gaz. **40**: 65. 1905.
Stony mountain sides of the pinyon, yellow pine, aspen, and spruce belts. Montana to New Mexico, westward to Nevada.

8. **Amelanchier utahensis** Koehne, Gatt. Pomac. 25. 1890.
Artemisia, pinyon, yellow pine, and aspen belts. Colorado and New Mexico, westward to Nevada and Arizona.

9. Amelanchier rubescens Greene, Pittonia **4:** 128. 1900.

Rocky mountain sides of the pinyon, yellow pine, and aspen belts. Colorado, New Mexico, Utah, and Nevada.

10. Amelanchier pallida Greene, Fl. Franc. 53. 1891.

Pinyon, yellow pine, and aspen belts. California and Nevada.

2. CRATAEGUS L. Hawthorn

Leaves rhombic-lanceolate to elliptic, obtuse to acuminate, singly or doubly serrate; fruit black ..... 1. C. rivularis.
Leaves ovate to obovate, rounded to acute, doubly serrate or lobed; fruit black. 2. C. douglasii.

1. Crataegus rivularis Nutt.; Torr. & Gray, Fl. N. Amer. **1:** 464. 1840.

Pinyon, yellow pine, and aspen belts. Wyoming to New Mexico, westward to Idaho and Nevada.

2. Crataegus douglasii Lindl. Bot. Reg. **21:** *pl. 1810*. 1835.

Crataegus punctata brevispina Dougl.; Hook. Fl. Bor. Amer. **1:** 201. 1833.

Along creeks and in meadows at 1,200 meters, upward to the aspen belt. Michigan to British Columbia, southward to Wyoming, Nevada, and California.

3. SORBUS L. Mountain-ash

Leaflets oblong-lanceolate, very acute; branches and rachis sparingly villous or glabrous; pedicels and hypanthium sparingly villous ..... 1. S. scopulina.
Leaflets elliptic to ovate, rounded or acutish at apex; branches, rachis, pedicels, and hypanthium mostly glabrous ..... 2. S. californica.

1. Sorbus scopulina Greene, Pittonia **4:** 130. 1900.

Aspen and spruce belts. Alberta and British Columbia, southward to New Mexico and Arizona.

2. Sorbus californica Greene, Pittonia **4:** 131. 1900.

Yellow pine and aspen belts; Sierra Nevada. California and western Nevada.

4. PERAPHYLLUM Nutt. Squaw-apple

1. Peraphyllum ramosissimum Nutt.; Torr. & Gray, Fl. N. Amer. **1:** 474. 1840.

Mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Oregon and California to western Colorado and northern New Mexico.

60. AMYGDALACEAE. Plum Family

Trees or shrubs; leaves alternate or fascicled, deciduous; flowers solitary, fascicled or racemose, 5-merous; sepals united at base; stamens 10 or more, inserted on the calyx tube; ovary commonly 1; fruit a drupe.

Leaves alternate (not fascicled), toothed, the teeth gland-tipped; drupe smooth, with pulpy exocarp; shrubs or trees ..... 1. PRUNUS.
Leaves fascicled, entire or toothed, the teeth not gland-tipped; drupe pubescent, with almost dry exocarp; spinescent shrubs, 1 meter high or less. 2. EMPLECTOCLADUS.

1. PRUNUS L. Plum. Cherry

Flowers in corymbs or umbels. Leaves obovate to oblanceolate, 3 to 8 cm. long, crenate; sepals rounded; petals obovate; fruit dark red or black. Plums, Cherries.

Leaves glabrous or nearly so_____1. P. emarginata.
Leaves pubescent_____2. P. prunifolia.

Flowers in elongate racemes. CHOKECHERRIES.

Leaves glabrous, obovate to oval, abruptly acute or acuminate, cordate or rounded, 5 to 10 cm. long_____3. P. melanocarpa.
Leaves more or less pubescent beneath.
Pedicels glabrous, longer than the (8 to 10 mm. thick) purplish fruit; leaves obovate to obovate-oblong, 5 to 10 cm. long, acuminate.
4. P. demissa.
Pedicels pubescent, shorter than the (10 to 12 mm. thick) black fruit; leaves obovate to elliptic, 5 to 7 cm. long, subcordate_____5. P. valida.

1. Prunus emarginata (Dougl.) Walp. Repert. Bot. **2**: 9. 1843.

QUININE CHERRY.

Cerasus emarginata Dougl.; Hook. Fl. Bor. Amer. **1**: 169.1830.

Pinyon, yellow pine, and aspen belts. Idaho to British Columbia, California, and Nevada.

2. Prunus prunifolia (Greene) Shafer; Britt. & Shaf. N. Amer. Trees 500. *f. 461.* 1908.

Cerasus mollis Dougl.; Hook. Fl. Bor. Amer. **1**: 169. 1830. Not *C. mollis* Torr. 1824.

Cerasus prunifolia Greene, Proc. Biol. Soc. Washington **18**: 57. 1905.

Along streams and on moist slopes. British Columbia to Idaho, southward to California and Arizona (?).

3. Prunus melanocarpa (A. Nels.) Rydb. Bull. Torrey Club **33**: 143. 1906.

BLACK CHOKECHERRY.

Cerasus demissa melanocarpa A. Nels. Bot. Gaz. **34**: 25. 1902.

Moist canyons and mountain sides of the pinyon, yellow pine, and aspen belts. Alberta and British Columbia, southward to New Mexico and California.

4. Prunus demissa (Nutt.) D. Dietr. Syn. Pl. **3**: 43. 1843.

WESTERN CHOKECHERRY.

Cerasus demissa Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 411. 1840.

Aspen belt. British Columbia to Idaho and California. Perhaps outside of our range.

5. Prunus valida (Woot. & Standl.) Rydb. Fl. Rocky Mount. 451, 1062. 1917.

Padus valida Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 134, 1913.

Pinyon, yellow pine, and aspen belts. New Mexico and southeastern Utah.

Prunus americana Marsh. Arb. Amer. 111. 1785. AMERICAN PLUM.

This species, which is readily distinguished from *Prunus emarginata* by its glabrous, lanceolate to obovate, acuminate leaves, has been collected on the Dixie-Sevier National Forest at an elevation of 1,500 meters, where it probably has escaped from cultivation.

2. EMPLECTOLADUS Torr.

Leaves sparingly crenulate, 10 to 20 mm. long, oblanceolate, acute, puberulent; petals orbicular; fruit 1 cm. long; diffuse shrub_____1. E. andersonii.
Leaves entire or nearly so, 5 to 20 cm. long, spatulate, mostly obtuse, puberulent; petals spatulate; fruit 1 cm. long; divaricately branched shrub.
2. E. fasciculatus.

1. **Emplectocladus andersonii** (A. Gray) Nels. & Kenn. Muhlenbergia 3: 139. 1908. NEVADA WILD ALMOND.
Prunus andersonii A. Gray, Proc. Amer. Acad. 7: 337. 1868.
Artemisia and pinyon belts. Central Nevada to California.

2. **Emplectocladus fasciculatus** Torr. Pl. Frem. 10. *pl. 5.* 1853.
CALIFORNIA DESERT ALMOND.
Covillea, artemisia, and pinyon belts. California, southern Nevada, southern Utah, and Arizona.

61. MIMOSACEAE. Mimosa Family

Perennials, shrubs, or small trees, usually spiny; leaves bipinnate, with numerous leaflets; flowers regular, in axillary pedunculate heads or spikes, 4 or 5-merous; calyx gamosepalous; corolla of distinct or united petals; stamens 5 or more, free or monadelphous; style simple; placenta parietal; fruit a legume.

Spineless perennial, woody at base, 30 cm. high or less. Pinnae 4 or more pairs; leaflets 2 to 3 mm. long, pilose; flowers in globose heads; corolla gamopetalous; stamens numerous; pod flat, 3 to 4 cm. long, linear-oblong. **1. CALLIANDRA.**

Spiny shrubs or small trees.

Leaflets 4 or 5 pairs, oblong or obovate, 10 mm. long or less, pubescent; branches with short hooked prickles. Pinnae 2 or 3 pairs; flowers in spikes; pod flat, curved, more or less constricted_____**2. ACACIA.**

Leaflets 5 to 30 pairs, oblong to linear; branches with straight stipular spines.

Leaflets oblong, 6 to 8 mm. long, acute, puberulent; spikes 4 to 5 cm. long, long-pedunculate; pod twisted spirally into a straight cylinder 3 to 5 cm. long_____**3. STROMBOCARPA.**

Leaflets oblong to linear, 6 to 36 mm. long, obtuse or acute, glabrous; spikes 5 to 10 cm. long, short-pedunculate; pod straight or curved, 10 to 15 cm. long, more or less constricted_____**4. PROSOPIS.**

1. CALLIANDRA Benth.

1. **Calliandra humilis** Benth. Lond. Journ. Bot. 5: 103. 1846.
Hillsides and canyons of the Covillea belt; Grand Canyon. New Mexico and Arizona to Mexico.

2. ACACIA L. ACACIA

1. **Acacia greggii** A. Gray, Pl. Wright. 1: 65. 1852.
Plains and dry canyons of the Covillea belt. Western Texas to southwestern Utah, Nevada, and California.

3. STROMBOCARPA A. Gray. SCREWBEAN

1. **Strombocarpa odorata** (Torr. & Frém.) Torr. in Sitgreaves, Rep. Zuñi & Colo. 158. 1854.
Prosopis odorata Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 313. *pl. 1, f. 3.* 1845.
Prosopis pubescens Benth. Lond. Journ. Bot. 5: 82. 1846.
Plains and valleys of the Covillea belt. Western Texas to southern Utah and California.

4. PROSOPIS L. Mesquite

1. Prosopis glandulosa Torr. Ann. Lyc. N. Y. **2**: 192. *pl. 2*. 1828.

Plains, desert areas, and dry canyons of the Covillea and lower artemisia belts. Texas to southern Utah and California.

62. CAESALPINIACEAE. Senna Family

Herbs, shrubs, or trees; leaves alternate, simple or compound, mostly with stipules; flowers 5-merous, nearly regular or irregular; calyx mostly gamosepalous; petals free; stamens 10 or fewer; ovary 1-celled, 1 to many-ovuled; fruit a legume.

Plants shrubs or trees.

Leaves simple, reniform or nearly so, 10 cm. broad or less, petioled; flowers seemingly papilionaceous, rose-purple, in axillary fascicles; pod short-stipitate, oblong, flat, many-seeded_____1. CERCIS.

Leaves once or twice pinnate, the leaflets numerous, oblong-lanceolate or oval, short-stalked; flowers small, greenish, polygamous, in axillary racemes; pod linear-oblong, flat, nearly straight, many-seeded. Large tree, armed with simple or branching thorns_____2. GLEDITSIA.

Plants herbaceous perennials. Flowers racemose, yellow; corolla nearly regular.

Leaves pinnate. Pods linear-oblong, 3 to 4 cm. long_____3. CASSIA.

Leaves bipinnate, with 5 to 7 pinnae. Leaflets crowded, 4 to 6 pairs, elliptic, inequilateral, 5 mm. long or less, puberulent, bluish green; petals obovate to oblanceolate; pod flat, somewhat falcate, 4 cm. long or less.
4. HOFFMANSEGGIA.

1. CERCIS L. Redbud

Leaves with open or rounded sinus_____1. C. occidentalis.
Leaves with closed sinus, the basal lobes overlapping_____2. C. orbiculata.

1. Cercis occidentalis Torr.; A. Gray, Bost. Journ. Nat. Hist. **6**: 77. 1850.
California redbud.

Canyons and rocky hillsides of the pinyon belt; Charleston Mountains, Nevada. California, southern Nevada, and Arizona.

2. Cercis orbiculata Greene, Repert. Nov. Sp. Fedde **11**: 111. 1912.

Rocky canyons; Diamond Valley, Utah.

2. GLEDITSIA L. Honeylocust

1. Gleditsia triacanthos L. Sp. Pl. 1056. 1753.

In cultivation. New York to Michigan, Georgia, and Texas.

3. CASSIA L.

Plant 30 to 60 cm. high, more or less tomentose; leaflets 2 or 3 pairs, obovate-oblong, inequilateral at base, 2.5 cm. long or less; recemes axillary, exceeding the leaves; petals 8 to 12 mm. long; pod pubescent, acute, 2-valved, 25 mm. long or less_____1. C. covesii.

Plant 1 meter high, puberulent, strikingly yellowish green; leaflets 2 or 3 pairs, thick, round-ovate, about 5 mm. long; racemes short, terminal; petals 4 to 6 mm. long; pod glabrate, linear-oblong, 35 mm. long or less.
2. C. armata.

1. Cassia covesii A. Gray, Proc. Amer. Acad. 7: 399. 1868.
Desert areas of the Covillea belt. New Mexico to southern Nevada (?) and southern California.

2. Cassia armata S. Wats. Proc. Amer. Acad. 9: 136. 1876.
Desert areas and canyons of the Covillea belt. Southern California, southern Nevada, and Arizona.

4. HOFFMANSEGGIA Cav.

1. Hoffmanseggia repens (Eastw.) Cockerell, Muhlenbergia 4: 68. 1908
Caesalpina repens Eastw. Zoe 4: 116. *pl. 26.* 1893.
Washes and desert areas of the artemisia belt; Green River, Utah.

63. KRAMERIACEAE. Krameria Family

Woody perennials or low shrubs; leaves alternate, estipulate; flowers irregular; calyx of 4 or 5 unequal sepals, exceeding the petals, these free or connate and hetermorphous; stamens 3 or 4, monadelphous; ovary 1-celled; fruit indehiscent, echinate, 1-seeded.

1. KRAMERIA Loefl.

Peduncles, calyx, and often the leaves and branches covered with stipitate glands; leaves linear, about 10 mm. long, cinereous-pubescent; low shrub with long weak spines ..... 1. K. glandulosa.
Peduncles and calyx glandless; leaves linear-oblong, 5 to 10 mm. long, cinereous-pubescent or tomentose; diffusely branched shrub, 30 to 60 cm. high, with rather stiff divaricate spines ..... 2. K. grayi.

1. Krameria glandulosa Rose & Painter, Contr. U. S. Nat. Herb. 10: 108. 1906.
Desert areas and hillsides of the Covillea belt. Western Texas to southwestern Utah and southern California, southward to Mexico.

2. Krameria grayi Rose & Painter, Contr. U. S. Nat. Herb. 10: 108. 1906.
Desert areas and hillsides of the Covillea belt. Southern Nevada, southern California, Arizona, and Mexico.

64. FABACEAE. Pea Family

Herbs, shrubs, or trees with alternate, stipulate, simple or compound leaves; inflorescence mostly racemose or capitate; flowers papilionaceous; calyx of 5 more or less united sepals; petals 5, the upper (banner) large, the lateral (wings) oblique, the lower two more or less coherent, forming the keel; stamens mostly 10, monadelphous, diadelphous, or distinct; style 1; ovary 1 or 2-celled; ovules 1 to many; fruit a 1 or 2-celled pod.

Leaves with tendrils.
Style filiform, hairy all around the apex; stamen tube usually oblique at summit ..... 18. VICIA.
Style flattened, hairy on the inner side; stamen tube truncate or nearly so. ..... 19. LATHYRUS.

Leaves without tendrils.
Stipules spinelike. Stamens 10, diadelphous.
Leaflets with stipels; trees with pinnate leaves; leaflets elliptic to ovate; banner broad, reflexed; keel incurved; pod 5 to 10 cm. long, flat, many-seeded ..... 11. ROBINIA.
Leaflets without stipels; herbs or undershrubs with obovate to elliptic leaflets; banner obovate, recurved; keel incurved; pod linear, 5 cm. long. ..... 12. PETERIA.

Stipules bristle-like, foliaceous, or glandular.
Leaves unifoliolate----13. **ASTRAGALUS.**
Leaves with 2 to many leaflets.
Leaves palmately 3 to many-foliolate.
Leaves gland-dotted----8. **PSORALEA.**
Leaves not gland-dotted.
Flowers in globose or oblong heads. Leaflets 3 (3 to 7 in some species), mostly toothed; seeds solitary or few-6. **TRIFOLIUM.**
Flowers racemose or spicate.
Leaflets 3, entire; stipules broad, foliaceous; flowers yellow, large; stamens 10, distinct; pod narrow, 2-valved, many-seeded. **2. THERMOPSIS.**
Leaflets 5 to 15 (rarely 1 to 3); stipules narrow; flowers various; stamens monadelphous; pod 2-valved, 2 to many-seeded. **3. LUPINUS.**
Leaves pinnately 2 to many-foliolate.
Stamens distinct or nearly so. Perennials with bristle-like stipules; leaflets 9 or more; flowers racemose----1. **SOPHORA.**
Stamens monadelphous or diadelphous.
Leaves conspicuously gland-dotted.
Pods prickly (glandular in one introduced species). Robust perennials; leaflets 11 to 23.
Flowers yellowish white, spicate; pod oblong, 12 to 15 mm. long, covered with prickles or glands; leaflets lanceolate, oblong, or ovate----15. **GLYCYRRHIZA.**
Flowers rose-colored, 10 mm. long; pod semi-orbicular, flat, 1 or 2-seeded, pectinately prickly on the lower suture; leaflets elliptic to oblong----17. **ONOBRYCHIS.**
Pods not prickly, 1 to 4-seeded. Flowers in spikes or spikelike racemes.
Stamens 5, monadelphous. Calyx campanulate, the teeth short and broad; banner clawed, the wing and keel petals distinct----10. **PETALOSTEMON.**
Stamens 10, diadelphous.
Flowers in terminal or lateral spikes; pod included, usually 1-seeded----9. **PAROSELA.**
Flowers in axillary pedunculate racemes; fruit a loment, breaking up into rounded indehiscent joints. **16. HEDYSARUM.**
Leaves inconspicuously or not at all gland-dotted.
Keel produced into a porrect beak. Calyx campanulate, the teeth nearly equal; petals clawed; pods sessile or stipitate, coriaceous, nearly 2-celled; mostly acaulescent perennials. **14. OXYTROPIS.**
Keel blunt or with a curved beak.
Pods (loments) more or less constricted between the seeds, breaking up into 1-seeded indehiscent joints. **16. HEDYSARUM.**
Pods not breaking up into 1-seeded indehiscent joints.
Flowers yellow or pinkish, solitary or in heads or umbels.
Keel with or without an incurved beak; stipules glandlike, foliaceous, or scarious----7. **LOTUS.**

Flowers racemose, spicate, or capitate.
Leaflets 1 to many, entire----------13. **ASTRAGALUS.**
Leaflets 3, toothed. Calyx pediceled, campanulate, the teeth nearly equal.
Flowers in headlike racemes; pods curved or spirally coiled----------4. **MEDICAGO.**
Flowers in lax racemes; pods short, straight, reticulate----------5. **MELILOTUS.**

1. SOPHORA L. Sophora

Leaflets linear (4 or more pairs), 15 mm. long or less; flowers blue, nearly 2 cm. long; calyx campanulate; plants about 30 cm. high, silvery-silky. **1. S. stenophylla.**
Leaflets oblong or obovate-oblong (7 or more pairs), about 15 mm. long; plants 10 to 20 cm. high, greenish, sparingly silky----------**2. S. sericea.**

1. Sophora stenophylla A. Gray in Ives, Rep. Colo. Riv. **4**: 10. 1861.

Plains, dry hillsides, and canyons of the Covillea belt. Southern Utah, northern Arizona, and New Mexico.

2. Sophora sericea Nutt. Gen. Pl. **1**: 280. 1818.

Plains and dry hillsides of the artemisia belt; Grand Junction, Colorado. South Dakota to Texas, Utah (?), and Wyoming.

2. THERMOPSIS R. Br. Thermopsis

Stipules lanceolate to oblong, more than twice longer than broad. Leaflets oblanceolate to oblong-lanceolate; corolla 15 to 20 mm. long; pod 4 to 6 cm. long----------**1. T. montana.**
Stipules ovate, oblique, not more than twice longer than broad. Corolla 2 cm. long or more; pods 5 to 7 cm. long.
Leaflets rhombic-elliptic or nearly so; pod about 5 mm. broad, erect. **2. T. ovata.**
Leaflets oblong to obovate-oblong; pod spreading, 6 to 7 mm. broad. **3. T. pinetorum.**

1. Thermopsis montana Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 388. 1840.

Thermopsis angustata Greene, Pl. Baker. **3**: 34. 1901.

Pinyon, yellow pine, aspen, and spruce belts. Montana to Colorado, Utah, and Oregon.

2. Thermopsis ovata (Robinson) Rydb. Bull. Torrey Club **40**: 43. 1913.

Thermopsis montana ovata Robinson in Piper, Contr. U. S. Nat. Herb. **11**: 349. 1906.

Pinyon, yellow pine, and aspen belts. Washington and Idaho to Utah.

3. Thermopsis pinetorum Greene, Pittonia **4**: 138. 1900.

Aspen and spruce belts. Colorado and eastern Utah.

3. LUPINUS L. Lupine

(Contributed by W. W. Eggleston)

Flowers axillary, solitary, ochroleucous, 3 to 4 mm. long. Annual, 2 to 3 cm. high, villous, diffusely branched; leaflets 3 to 5, oblong-spatulate; pod 4 mm. long----------**1. L. uncialis.**
Flowers in terminal racemes.

Plants annual; cotyledons broad and clasping; ovules 2 (rarely 3).
Flowers mainly verticillate, bluish purple, 12 mm. long, in spikes 6 to 7 cm. long. Lower calyx lip scarious, the upper 3-toothed; pods villous; leaflets 5 to 7, lance-obovate, villous_____2. L. malacophyllus.
Flowers not verticillate.
Flowers usually crowded into headlike racemes. Pods about 1 cm. long, villous or hirsute.
Stems seldom over 1 cm. long; leaves crowded, basal; flowers 6 to 8 mm. long, bright or pale blue; upper calyx lip 2-lobed, the lower 2 or 3-toothed_____3. L. brevicaulis.
Stems elongate; leaves scattered, leaflets oblanceolate, silky-villous; flowers 8 mm. long, purplish; calyx lips nearly equal, the lower 2-toothed_____4. A. kingii.
Flowers scattered in elongate racemes.
Plants densely pubescent with hairs about 1 mm. long. Leaflets spatulate to oblanceolate; flowers blue or purple, the petals little exceeding the calyx; upper calyx lobe 2-cleft, the lower toothed; pod 10 to 12 mm. long_____5. L. shockleyi.
Plants loosely villous with hairs about 2 mm. long, or varying to glabrate.
Racemes equaled by or little surpassed by the foliage; pedicels usually hairy. Pods about 2 cm. long; leaflets 5 to 8, oblong-lanceolate, glabrous above.
Flowers 10 to 12 mm. long, rose or purple; lower calyx lip over twice longer than wide_____6. L. pusillus.
Flowers 7 to 8 mm. long, violet-white or pinkish; lower calyx lobe barely longer than wide_____7. L. intermontanus.
Racemes obviously surpassing the foliage; pedicels usually glabrous.
Calyx entirely glabrous; flowers bluish purple, 1 cm. long. Pod 2 cm. long; leaflets obovate to oblanceolate____8. L. odoratus.
Calyx lips setose-villous, unequal; flowers rose or dark purple, the banner marked with yellow.
Branches tardily developing, the axial peduncles erect and early flowering; leaflets 6 to 7, oblanceolate, 2 to 3 cm. long. 9. L. rubens.
Branches developing early, widely spreading, floriferous; leaflets 8, obovate-oblanceolate, 15 mm. long or less. 10. L. flavoculatus.
Plants annual or perennial; cotyledons petioled after germination; ovules several. Pods broadly linear.
Plants annual.
Leaflets mostly linear, villous. Flowers mostly bright blue, 10 mm. long; upper calyx lip 2-fid, the lower 3-toothed_____11. L. sparsiflorus.
Leaflets spatulate to oblanceolate, obtuse or acutish. Calyx cleft nearly to base, the upper lip 2-fid, the lower 3-fid.
Leaflets densely villous-hirsute; flowers 7 mm. long, reddish purple. 12. L. concinnus.
Leaflets sparingly strigose; flowers 8 to 10 mm. long, blue to ochroleucous_____13. L. arizonicus.
Plants perennial.
Plants shrubby, one meter high_____14. L. excubitus.

Plants herbaceous (sometimes woody at base of stem).
Plants less than 30 cm. high.
Stems 15 cm. or less, woody at base. Recemes short.
Plants nearly stemless. Spikes much shorter than leaves; pedicels 1 mm. long----------15. L. caespitosus.
Plants with stems well developed.
Basal leaves longer than flower spikes or of about equal length.
Plant hoary-canescent with short hairs----------16. L. cusickii.
Plant greener, with long silky hairs----------17. L. brachypodus.
Basal leaves shorter than flower spikes.
Leaves nearly glabrous above----------18. L. lyallii.
Leaves pubescent on both sides.
Plant appressed-hirsute----------19. L. lobbii.
Plant villous----------20. L. breweri.
Stems over 15 cm. and usually less than 30 cm. high.
Flowers 10 to 15 mm. long.
Pubescence villous----------21. L. grayii.
Pubescence long and silky----------22. L. saxosus.
Flowers less than 10 mm. long.
Leaves mostly basal.
Pubescence silky and silvery----------23. L. lepidus.
Pubescence somewhat loose and shaggy, not silvery. 24. L. aridus.
Leaves present on the stems----------25. L. confertus.
Plants 30 cm. high or more.
Rootstock horizontal.
Flowers less than 10 mm. long----------26. L. onustus.
Flowers over 10 mm. long.
Pubescence of stem appressed----------27. L. plattensis.
Pubescence of stem long, spreading----------28. L. ammophilus.
Rootstock erect.
Leaves glabrous on upper surface or nearly so.
Flowers more than 12 mm. long.
Stems pubescent or tomentose.
Pubescence of stem appressed----------29. L. sitgreavesii.
Pubescence of stem spreading----------30. L. wyethii.
Stems glabrous.
Leaves slightly appressed-pubescent on both sides. 31. L. pratensis.
Leaves glabrous above.
Bracts linear-subulate, much exceeding the flowers; pubescence strigose----------32. L. burkei.
Bracts lanceolate, scarcely exceeding the flowers; pubescence short-woolly----------33. L. polyphyllus.
Flowers less than 12 mm. long.
Flowers less than 8 mm. long----------34. L. parviflorus.
Flowers 8 mm. long or longer.
Banner slightly pubescent. Plant silvery. 35. L. argenteus.
Banner glabrous.
Banner conspicuously spotted----------36. L. spathulatus.
Banner not conspicuously spotted----------37. L. foliosus.

Leaves pubescent on upper surface.
Flowers yellow——38. L. sulphureus.
Flowers blue, purple, or white.
Calyx spurred.
Spurs 2 to 3 mm. long——39. L. calcaratus.
Spurs less than 2 mm. long.
Flowers less than 12 mm. long.
Spikes loosely flowered——40. L. laxiflorus.
Spikes closely flowered.
Flowers less than 9 mm. long——41. L. tenellus.
Flowers more than 9 mm——42. L. caudatus.
Flowers 12 mm. long or more.
Banner pubescent——43. L. barbiger.
Banner glabrous——44. L. humicola.
Calyx not spurred.
Flowers nearly sessile——45. L. leucophyllus.
Flowers on well developed pedicels.
Banner glabrous.
Keel naked——46. L. andersoni.
Keel ciliate.
Plant silvery——47. L. meionanthus.
Plant green.
Leaves slightly hairy above——48. L. alpestris.
Leaves woolly above——49. L. nevadensis.
Banner pubescent.
Plants densely silvery——50. L. ornatus.
Plants green.
Bracts not exceeding full-grown buds.
51. L. sericeus.
Bracts exceeding full-grown buds.
Hairs of stem appressed——52. L. flexuosus.
Hairs of stem spreading——53. L. comatus.

1. **Lupinus uncialis** S. Wats. in King, Geol. Expl. 40th Par. 5: 54. *pl.* 7, *f.* 5–10. 1871.
Rocky hillsides of the artemisia belt. Nevada.

2. **Lupinus malacophyllus** Greene, Pittonia 1: 215. 1888.
Plains and dry hillsides of the artemisia and pinyon belts. Nevada.

3. **Lupinus brevicaulis** S. Wats. in King, Geol. Expl. 40th Par. 5: 53. *pl.* 7. *f.* 1–4. 1871.
Lupinus dispersus Heller, Muhlenbergia 5: 141. 1909.
Lupinus scaposus Rydb. Bull. Torrey Club 34: 45. 1907.
Valleys, plains, and mountain sides of the artemisia, pinyon, and yellow pine belts. Colorado to Arizona and Mexico, westward to Oregon and California.

4. **Lupinus kingii** S. Wats. Proc. Amer. Acad. 8: 534. 1873.
Lupinus sileri S. Wats. Proc. Amer. Acad. 10: 345. 1875.
Lupinus capitatus Greene, Pittonia 1: 171. 1888.
Plains, mountain sides, and canyons of the artemisia belt, upward to the aspen belt. Colorado, New Mexico, Utah, and Arizona.

5. **Lupinus shockleyi** S. Wats. Proc. Amer. Acad. 22: 470. 1887.
Plains and hillsides of the Covillea belt. Southern Nevada, California, and western Arizona.

6. Lupinus pusillus Pursh, Fl. Amer. Sept. 468. 1814.

Plains and hillsides of the artemisia and pinyon belts. Saskatchewan and Alberta, southward to Kansas, New Mexico, and Idaho.

7. Lupinus intermontanus Heller, Muhlenbergia 8: 87. *pl. 12.* 1912.

Plains and hillsides of the artemisia belt. Wyoming and Colorado, westward to Washington and California

8. Lupinus odoratus Heller, Muhlenbergia 2: 71. 1905.

Covillea and artemisia belts. Southern Nevada, California, and Arizona.

9. Lupinus rubens Rydb. Bull. Torrey Club 34: 45. 1907.

Covillea and artemisia belts. Utah, Arizona, Nevada, and California.

10. Lupinus flavoculatus Heller, Muhlenbergia 5: 149. *pl. 5.* 1909.

Covillea and lower artemisia belts. Nevada and southern California. Perhaps only a form of the preceding species.

11. Lupinus sparsiflorus Benth. Pl. Hartw. 303. 1848.

Plains and hillsides of the Covillea belt. Nevada, southern California, Lower California, and Arizona.

12. Lupinus concinnus Agardh, Syn. Gen. Lupin. 6. *pl. 1, f. 1.* 1835.

Lupinus micensis Jones, Proc. Calif. Acad. II. 5: 630. 1895.

Plains and hillsides of the Covillea belt. Central California to Lower California, eastward to southern Utah, New Mexico, and Sonora.

13. Lupinus arizonicus S. Wats. Proc. Amer. Acad. 12: 250. 1877.

Lupinus concinnus arizonicus S. Wats. Proc. Amer. Acad. 8: 537. 1873.

Lupinus sparsiflorus arizonicus C. P. Smith, Bull. Torrey Club 47: 495. 1920.

Covillea belt. Southern Nevada, Arizona, California, and Sonora.

14. Lupinus excubitus Jones, Contr. West. Bot. 8: 26. 1898.

Gravelly mesas, cliffs, and canyons in the Covillea, artemisia, and pinyon belts. Inyo County, California.

15. Lupinus caespitosus Nutt.; Torr. & Gray, Fl. N. Amer. 1: 379. 1840.

Lupinus watsoni Heller, Muhlenbergia 1: 114. 1905.

Gravelly valleys of mountain streams in the yellow pine and aspen belts. Montana to Colorado, Utah, and Idaho.

16. Lupinus cusickii S. Wats. Proc. Amer. Acad. 22: 469. 1887.

Sterile hillsides in the artemisia, pinyon, and yellow pine belts. Oregon.

17. Lupinus brachypodus Piper, Bull. Torrey Club 29: 642. 1902.

Lupinus abortivus Greene, Muhlenbergia 8: 117. 1912.

Lupinus volutans Greene, Muhlenbergia 8: 118. 1912.

Sterile hillsides and valleys of the artemisia, pinyon, and yellow pine belts. Oregon.

18. Lupinus lyallii A. Gray, Proc. Amer. Acad. 7: 334. 1868.

Lupinus danaus A. Gray, Proc. Amer. Acad. 7: 335. 1868.

Lupinus alpinus Heller, Muhlenbergia 6: 22. 1910.

Gravelly ridges in the higher altitudes of the Cascades and northern Sierra Nevada, ranging from the yellow pine zone to the summits of many of the peaks. British Columbia to California.

19. Lupinus lobbii A. Gray in S. Wats. Proc. Amer. Acad. 8: 533. 1873.

Lupinus pinetorum Heller, Muhlenbergia 6: 25. *pl. 1.* 1910.

Lupinus washoensis Heller, Muhlenbergia 6: 72. 1910.

Yellow pine to the subalpine belt. California and Nevada.

20. Lupinus breweri A. Gray, Proc. Amer. Acad. **7**: 334. 1868.

Moist gravelly ridges of the pinyon to the subalpine belts. California, Nevada, and Oregon.

21. Lupinus grayii S. Wats. Proc. Amer. Acad. **11**: 126. 1876.

Lupinus hesperius Heller, Muhlenbergia **2**: 212. 1906.

Gravelly ridges in the pinyon and yellow pine belts. California.

22. Lupinus saxosus Howell, Erythea **1**: 110. 1893.

Volcanic ridges of the juniper to the yellow pine belt. Washington, Oregon, and Nevada.

23. Lupinus lepidus Dougl. in Lindl. Bot. Reg. *pl. 1149*. 1828.

Dry prairies of the yellow pine belt. British Columbia to California.

24. Lupinus aridus Dougl. in Lindl. Bot. Reg. *pl. 1242*. 1829.

Dry prairies in the yellow pine belt. Washington to California.

25. Lupinus confertus Kellogg, Proc. Calif. Acad. **2**: 192. *f. 59*. 1863.

Lupinus sellulus Kellogg, Proc. Calif. Acad. **5**: 36. 1875.

Moist sandy places in woods and meadows of the pinyon and yellow pine belts. California and Nevada.

26. Lupinus onustus S. Wats. Proc. Amer. Acad. **11**: 127. 1876.

Yellow pine belt. Central California.

27. Lupinus plattensis S. Wats. in Proc. Amer. Acad. **17**: 369. 1881.

Lupinus ornatus glabratus S. Wats. Proc. Amer. Acad. **8**: 528. 1873.

Plains and hills of the artemisia, pinyon, and yellow pine belts. Nebraska to Wyoming, southward to Kansas and Colorado.

28. Lupinus ammophilus Greene, Pittonia **4**: 136. 1900.

Lupinus crassus Payson, Bot. Gaz. **60**: 376. 1915.

Warm sandy slopes of the yellow pine and aspen belts. Colorado, New Mexico, and Utah.

29. Lupinus sitgreavesii S. Wats. Proc. Amer. Acad. **8**: 527. 1873.

Lupinus amplus Greene, Pl. Baker. **3**: 36. 1901.

Gravelly slopes of the yellow pine and aspen belts. Arizona and New Mexico.

30. Lupinus wyethii S. Wats. Proc. Amer. Acad. **8**: 525. 1873.

Grassy slopes of the pinyon and yellow pine belts. Idaho and Washington.

31. Lupinus pratensis Heller, Muhlenbergia **2**: 210. 1906.

Wet sandy meadows of the pinyon and yellow pine belts. Inyo County, California.

32. Lupinus burkei S. Wats. Proc. Amer. Acad. **8**: 525. 1873.

Lupinus ligulatus Greene, Pittonia **1**: 215. 1888.

Lupinus longipes Greene, Fl. Franc. 41. 1891.

Lupinus superbus Heller, Muhlenbergia **2**: 209. 1906.

Lupinus elongatus Greene, Muhlenbergia **6**: 17. 1910.

Lupinus procerus Greene, Muhlenbergia **6**: 19. 1910.

Wet meadows of the pinyon and yellow pine belts. British Columbia to California, eastward to Montana and Wyoming.

33. Lupinus polyphyllus Lindl. Bot. Reg. *pl. 1096*. 1827.

Wet meadows in the yellow pine and aspen belts. British Columbia to California.

34. Lupinus parviflorus Nutt.; Hook. & Arn. Bot. Beechey Voy. 366. 1840.
Lupinus floribundus Greene, Proc. Acad. Phila. **1892**: 364. 1893.
Lupinus myrianthus Greene, Pittonia **4**: 134. 1900.
Lupinus leptostachys Greene, Pl. Baker. **3**: 36. 1901.
Lupinus fulvomaculatus Payson, Bot. Gaz. **60**: 376. 1915.
Mountains, meadows, and open woods of the yellow pine, aspen, and spruce belts. Montana to Colorado and Utah.

35. Lupinus argenteus Pursh, Fl. Amer. Sept. 468. 1814.
Lupinus decumbens Torr. Ann. Lyc. N. Y. **2**: 191. 1828.
Plains and hills of the artemisia, pinyon, yellow pine, and aspen belts. North Dakota to New Mexico, Colorado, and Utah.

36. Lupinus spathulatus Rydb. Bull. Torrey Club **29**: 244. 1902.
Lupinus maculatus Rydb. Bull. Torrey Club **30**: 257. 1903.
Lupinus leucanthus Rydb. Bull. Torrey Club **30**: 259. 1903.
Lupinus marianus Rydb. Bull. Torrey Club **34**: 41. 1907.
Lupinus laxispicatus Rydb. Bull. Torrey Club **34**: 42. 1907.
Lupinus stenophyllus Rydb. Bull. Torrey Club **34**: 42. 1907.
Thickets of the yellow pine, aspen, and spruce belts. Utah and western Colorado.

37. Lupinus foliosus Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 377. 1840.
Hills and plains of the yellow pine belt. Idaho and Montana.

38. Lupinus sulphureus Dougl.; Hook. Fl. Bor. Amer. **1**: 166. 1834.
Rocky slopes of the artemisia and yellow pine belts. Oregon, Washington, and Idaho.

39. Lupinus calcaratus Kellogg, Proc. Calif. Acad. **2**: 195. *f. 60*. 1863.
Lupinus multitinctus A. Nels. Bot. Gaz. **53**: 221. 1912.
Lupinus variegatus Heller, Muhlenbergia **8**: 89. 1912.
Hills and plains of the pinyon, yellow pine, and aspen belts. Idaho and Oregon to Utah and California.

40. Lupinus laxiflorus Dougl. in Lindl. Bot. Reg. *pl. 1140*. 1828.
Open woods of the pinyon, yellow pine, and aspen belts. British Columbia to Idaho and Nevada.

41. Lupinus tenellus Dougl.; Don, Hist. Dichl. Pl. **2**: 367. 1832.
Meadows and hillsides of the pinyon and yellow pine belts. Washington to Montana, Colorado, and California.

42. Lupinus caudatus Kellogg, Proc. Calif. Acad. **2**: 197. *f. 61*. 1863.
Lupinus palmeri S. Wats. Proc. Amer. Acad. **8**: 530. 1873.
Lupinus aduncus Greene, Pittonia **4**: 132. 1900.
Lupinus oreophilus Greene, Pittonia **4**: 135. 1900. Not *L. oreophilus* Phil. 1891.
Lupinus argentinus Rydb. Bull. Torrey Club **30**: 257. 1903.
Lupinus greenei A. Nels.; Coulter, New Man. Rocky Mount. 274. 1909.
Lupinus montigenus Heller, Muhlenbergia **6**: 109. *f. 18*. 1910.
Plains, river banks, and canyons of the pinyon and aspen belts. Oregon and Nevada to Wyoming and Utah.

43. Lupinus barbiger S. Wats. Proc. Amer. Acad. **8**: 528. 1873.
Lupinus bakeri Greene, Pittonia **4**: 132. 1900.
Lupinus arceuthinus Greene, Pl. Baker. **3**: 35. 1901.
Lupinus dichrous Greene, Pl. Baker. **3**: 35. 1901.
Lupinus jonesii Rydb. Bull. Torrey Club **30**: 256. 1903.
Lupinus inyoensis Heller, Muhlenbergia **2**: 211. 1906.

Sandy plains and hills of the Covillea, artemisia, and pinyon belts. Colorado, Utah, Arizona, and California.

44. Lupinus humicola A. Nels. Bull. Torrey Club **25**: 204. 1898.

Moist slopes in shade of the artemisia, pinyon, and yellow pine belts. Wyoming and Colorado.

45. Lupinus leucophyllus Dougl. in Lindl. Bot. Reg. *pl. 1124*. 1828.

Low ground in the yellow pine belt. British Columbia to Oregon, Utah, and Wyoming.

46. Lupinus andersoni S. Wats. in King. Geol. Expl. 40th Par. **5**: 58. 1871.

Rich shaded soil of the yellow pine belt. Nevada.

47. Lupinus meionanthus A. Gray, Proc. Amer. Acad. **6**: 522. 1865.

In granitic sand of the yellow pine, aspen, and spruce belts. Nevada and California.

48. Lupinus alpestris A. Nels. Bull. Torrey Club **26**: 127. 1899.

Lupinus alsophilus Greene, Pittonia **4**: 135. 1900.

Lupinus adscendens Rydb. Bull. Torrey Club **30**: 256. 1903.

Moist mountain woods of the yellow pine, aspen, spruce, and subalpine belts. Montana to Colorado and Utah.

49. Lupinus nevadensis Heller, Muhlenbergia **6**: 107. *f. 17*. 1910.

Artemisia, pinyon, and yellow pine belts. Nevada.

50. Lupinus ornatus Dougl. in Lindl. Bot. Reg. *pl. 1216*. 1829.

High prairies of the pinyon and yellow pine belts. Idaho, Washington, and Oregon.

51. Lupinus sericeus Pursh, Fl. Amer. Sept. 468. 1814.

Lupinus leucopsis Agardh, Syn. Gen. Lupin. 29. 1835.

Plains and canyons of the pinyon and yellow pine belts. Saskatchewan to South Dakota, Wyoming, Oregon, and Washington.

52. Lupinus flexuosus Lindl.; Agardh, Syn. Gen. Lupin. 34. 1835.

Lupinus subulatus Rydb. Bull. Torrey Club **34**: 43. 1907.

Gravelly soil of plains of the pinyon and yellow pine belts. Montana to Washington and Oregon.

53. Lupinus comatus Rydb. Bull. Torrey Club **30**: 257. 1903.

Lupinus habrocomus Greene, Leaflets **2**: 235. 1912.

Open mountain woods of the yellow pine, aspen, and spruce belts. Colorado and Utah.

4. MEDICAGO L.

Plants perennial, erect; leaflets oblong to cuneate-obovate, sharply dentate toward apex; corolla violet or blue, 8 to 10 mm. long. Pods pubescent, coiled ..... **1. M. sativa.**

Plants annual, prostrate, ascending, or spreading; leaflets oblong, rounded or obcordate; corolla small, yellow.

Pods pubescent, curved; flowers in short dense racemes or heads. **2. M. lupulina.**

Pods armed with curved prickles, coiled; flowers in few-flowered heads. **3. M. hispida.**

1. Medicago sativa L. Sp. Pl. 778. 1753. ALFALFA.

Waste places; escaped from cultivation throughout the United States. Europe.

2. Medicago lupulina L. Sp. Pl. 779. 1753. BLACK MEDICK.

Fields and waste places; introduced from Europe. Nova Scotia to Florida, westward to Washington, California, and Mexico.

3. Medicago hispida Gaertn. Fruct. & Sem. 2: 349. 1791. BUR-CLOVER.

Waste places in the Pacific States; introduced from Europe. Nova Scotia to Florida, westward to Washington and California.

5. MELILOTUS Juss. SWEETCLOVER

Corolla white, the banner exceeding the wings. Perennial, 1 to 3 meters high, glabrous or puberulent; leaflets obovate to oblanceolate, denticulate toward apex ..... 1. M. alba.

Corolla yellow, the banner equaling the wings.

Plant perennial, 1 to 3 meters high, glabrous or pubescent; leaflets broadly obovate, denticulate; corolla 5 to 7 mm. long ..... 2. M. officinalis.

Plant annual, 15 to 60 cm. high, glabrous or sparingly puberulent; leaflets obovate to oblanceolate, denticulate; corolla 2.5 mm. long .. 3. M. indica.

1. Melilotus alba Desr. in Lam. Encycl. 4: 63. 1797. WHITE SWEETCLOVER.

Fields and waste places; introduced from Europe. Nova Scotia to Virginia, westward to Washington and California.

2. Melilotus officinalis (L.) Lam. & DC. Fl. Franç. 2: 594. 1778.

YELLOW SWEETCLOVER.

Trifolium melilotus officinalis L. Sp. Pl. 765. 1753.

Waste places; introduced from Europe. Nova Scotia to Florida, westward to Idaho and New Mexico.

3. Melilotus indica (L.) All. Fl. Pedem. 1: 308. 1785.

Trifolium melilotus indica L. Sp. Pl. 765. 1753.

Fields and waste places; Las Vegas, Nevada; introduced from Europe. Local and about seaports in the Eastern States; common in the Southwestern States.

6. TRIFOLIUM L. CLOVER

Leaflets 3 to 9 (mostly more than 3). Involucre none; pubescent perennials.

Heads large, globose. Calyx teeth plumose, 10 mm. long or more; corolla yellow or purple; leaflets cuneate or obovate, spinulose-serrate, glabrous above ..... 1. T. macrocephalum.

Heads small or medium, globose. Plants low, cespitose, villous throughout; calyx teeth subulate, exceeding the tube; corolla ochroleucous to rose-pink.

Leaflets spatulate to oblanceolate, apiculate, 15 to 20 mm. long. 2. T. andersonii.

Leaflets oblanceolate, apiculate, about 10 mm. long, often glabrate above ..... 3. T. monoense.

Leaflets 3 (often 5 in No. 17).

Heads subtended by an involucre or by conspicuous involucral bracts.

Involucral bracts distinct or nearly so. Low, cespitose perennials.

Heads 1 to 3-flowered. Plant glabrous or nearly so; leaflets 5 to 10 mm. long, obovate to oblanceolate, spinulose-serrulate; calyx teeth equaling the tube; corolla ochroleucous ..... 19. T. monanthum.

Heads many-flowered.

Leaflets oblanceolate, about 10 mm. long, densely grayish-pubescent; calyx teeth exceeding the tube; corolla ochroleucous. 20. T. andinum.

Leaflets obovate to oblong, 10 to 40 mm. long, glabrous or nearly so; calyx teeth shorter than the tube; corollas purple__21. T. parryi.

Involucral bracts more or less united, forming a monophyllous disk.

Involucre nearly equaling the flowers. Annuals.

Calyx teeth ternately parted, the lobes setiform; corolla rose-colored; stems prostrate or ascending; leaflets glabrous, cuneate-obovate to elliptic, denticulate_____24. T. cyathiferum.

Calyx teeth simple; corolla small, purplish; stems ascending or procumbent; leaflets cuneate-obovate or obcordate, sparingly villous_____25. T. microcephalum.

Involucral bracts much shorter than the flowers. Calyx teeth equaling or longer than the tube.

Plant annual, with decumbent or ascending stems. Calyx teeth longer than the tube; corolla dark purple, tipped with white; leaflets obovate to obovate-oblong_____23. T. variegatum.

Plants perennial. Calyx teeth two-thirds to twice longer than the tube.

Involucral lobes subulate-lanceolate, mostly entire; corolla dark purple, tipped with white; upper leaflets oblong or lanceolate, mostly blunt, the lower obcordate_____26. T. fimbriatum.

Involucral lobes lanceolate, spinulose-toothed; corolla white or pinkish; upper leaflets oblong-lanceolate, mostly acute.
22. T. fendleri.

Heads not subtended by an involucre, or the subtending bracts inconspicuous.

Corolla yellow, small. Introduced, pubescent, spreading annual; leaves pinnately 3-foliolate, the leaflets cuneate-obovate, emarginate.
27. T. dubium.

Corolla white, purplish, or purple.

Calyx glabrous.

Peduncles axillary; introduced species.

Stems creeping; leaflets obovate to obcordate; corolla white.
15. T. repens.

Stems ascending; leaflets broadly obovate, rounded or emarginate; corolla white, tinged with pink_____14. T. hybridum.

Peduncles terminal; native species. Flowers rose-purple.

Plant low, densely cespitose. Leaflets cuneate-oblong or oblanceolate; calyx teeth shorter than the tube; corolla 18 to 20 mm. long_____16. T. nanum.

Plant 15 to 45 cm. high. Calyx teeth equaling or exceeding the tube; flowers reflexed in age.

Corolla about 10 mm. long; upper leaflets oblong to linear-lanceolate, acute or acuminate, denticulate_____13. T. kingii.

Corolla about 15 mm. long; upper leaflets elliptic-oblong, mostly obtuse, strongly veiny, denticulate_____12. T. beckwithii.

Calyx hairy.

Plants low, cespitose. Stems scapelike; calyx teeth much longer than the tube.

Leaflets oval or obovate, denticulate, glabrous above, silky beneath; corolla ochroleucous, 8 mm. long_____17. T. gymnocarpon.

Leaflets linear-lanceolate to lance-oblong, entire, pubescent or glabrate above; corolla ochroleucous to purple, 12 to 15 mm. long.
18. T. dasyphyllum.

Plants 15 to 60 cm. high (5 to 10 cm. high in No. 10). Stems more or less leafy.

Heads subsessile, globose. Calyx teeth equaling the tube; corolla purple; leaflets oval or obovate, rounded or retuse; free portion of the stipules ovate——4. T. pratense.

Heads pedunculate. Calyx teeth exceeding the tube; free portion of the stipules lanceolate.

Plants more or less villous. Calyx densely villous, the teeth 2 to 3 times as long as the tube; flowers reflexed in fruit.

Leaflets oblong, acute, 20 to 35 mm. long; corolla ochroleucous to purple——5. T. eriocephalum.

Leaflets long-linear, glabrous or pubescent; corolla ochroleucous and purple——6. T. harneyense.

Plants with appressed pubescence or nearly glabrous.

Flowers in age not reflexed, white to purplish. Leaflets obovate-oblong to lanceolate, glabrous above; calyx teeth long and slender.

Root creeping; plant more or less matted——9. T. longipes.

Root ascending or erect; plant not matted——10. T. hanseni.

Flowers in age reflexed.

Lower leaflets broadly ovate, 2 to 3 cm. long, the upper oblong-lanceolate, 3 to 5 cm. long, all dentate; calyx teeth equaling the tube. Corolla about 15 mm. long——7. T. macilentum.

Lower leaflets obovate or elliptic, smaller, the upper oblong to linear-lanceolate; calyx teeth 2 to 3 times longer than the tube.

Plant cespitose from a thick root; leaflets obovate or oblong, glabrous or nearly so; corolla salmon-colored.

8. T. rusbyi.

Plant not cespitose; leaflets oval to lanceolate, acute, glabrous above; corolla white, 15 mm. long——11. T. rydbergii.

1. Trifolium macrocephalum (Pursh) Poir. in Lam. Encyl. Suppl. **5**: 336. 1817.

Lupinaster macrocephalum Pursh, Fl. Amer. Sept. 479. 1814.

Valleys, hillsides, and plains of the artemisia belt. Idaho and Washington, southward to Nevada and California.

2. Trifolium andersonii A. Gray, Proc. Amer. Acad. **6**: 522. 1865.

Hills and mountain sides of the artemisia, pinyon, and yellow pine belts. California and western Nevada.

3. Trifolium monoense Greene, Erythea **2**: 181. 1894.

Spruce and alpine belts; White Mountains, Inyo Range. California and southwestern Nevada.

4. Trifolium pratense L. Sp. Pl. 768. 1753. RED CLOVER.

In cultivation and often escaped, throughout the United States. Native of the Old World.

5. Trifolium eriocephalum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 313. 1838.

Trifolium villiferum House, Bot. Gaz. **41**: 335. *fig. 3*. 1906.

Plains and mountainsides of the artemisia, pinyon, and yellow pine belts. Idaho and Washington, southward to Utah and California.

6. Trifolium harneyense Howell, Fl. Northw. Amer. 134. 1898.

Meadows of the artemisia belt. Idaho, Oregon, Nevada, and northern California.

7. Trifolium macilentum Greene, Pittonia **3**: 223. 1897.
Covillea and lower artemisia belts. Southern Utah and northern Arizona.

8. Trifolium rusbyi Greene, Pittonia **1**: 5. 1887.
Yellow pine and aspen belts. Southwestern Colorado, Arizona, Nevada, and California.

9. Trifolium longipes Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 314. 1838.
Trifolium pedunculatum Rydb. Bull. Torrey Club **30**: 254. 1903.
Valleys, canyons, and wet meadows of the artemisia, pinyon, and yellow pine belts. Idaho and Washington to Nevada and California.

10. Trifolium hanseni Greene, Erythea **3**: 17. 1895.
Mountain meadows; Sierra Nevada. California and western Nevada.

11. Trifolium rydbergii Greene, Pittonia **3**: 222. 1897.
Trifolium confusum Rybd. Bull. Torrey Club **34**: 46. 1907.
Yellow pine, aspen, and spruce belts. Montana to Colorado, Utah, and Idaho.

12. Trifolium beckwithii Brewer; S. Wats. Proc. Amer. Acad. **11**: 128. 1876.
Wet meadows of the artemisia belt; northern Nevada. South Dakota to Oregon and California.

13. Trifolium kingii S. Wats. in King, Geol. Expl. 40th Par. **5**: 59. 1871.
Wet meadows, canyons, and mountain parks of the aspen and spruce belts. Western Colorado to Oregon and California.

14. Trifolium hybridum L. Sp. Pl. 766. 1753. ALSIKE CLOVER.
Waste places; escaped from cultivation. Introduced from Europe.

15. Trifolium repens L. Sp. 767. 1753. WHITE CLOVER.
Waste places; escaped from cultivation. Introduced from Europe.

16. Trifolium nanum Torr. Ann. Lyc. N. Y. **1**: 35. *pl. 3. f. 4*. 1824.
Spruce and alpine belts. Montana to New Mexico and Utah.

17. Trifolium gymnocarpon Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 320. 1838.
Trifolium plummerae S. Wats. Bot. Calif. **2**: 440. 1880.
Pinyon and yellow pine belts. Montana to Colorado, Utah, and Nevada.

18. Trifolium dasyphyllum Torr. & Gray, Fl. N. Amer. **1**: 315. 1838.
Trifolium scariosum A. Nels. Bull. Torrey Club **29**: 401. 1902.
Trifolium uintense Rydb. Bull. Torrey Club **34**: 47. 1907.
Yellow pine, aspen, spruce, and alpine belts. Montana to Colorado and Utah.

19. Trifolium monanthum A. Gray, Proc. Acad. **6**: 523. 1865.
Yellow pine, aspen, and spruce belts. California and western Nevada.

20. Trifolium andinum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 314. 1838.
Mountain sides of the yellow pine and aspen belts. Wyoming and Utah.

21. Trifolium parryi A. Gray, Amer. Journ. Sci. II. **33**: 409. 1862.
Trifolium inaequale Rydb. Bull. Torrey Club **34**: 47. 1907.
Spruce and alpine belts. Wyoming, Colorado, and Utah.

22. Trifolium fendleri Greene, Pittonia **3**: 221. 1897.
Valleys and mountain sides, upward to the aspen belt. Colorado and Utah, southward to Mexico.

23. Trifolium variegatum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 317. 1838.
Trifolium ultramontanum Greene, Pittonia **3**: 218. 1897.
Trifolium subsalinum Greene, Pittonia **3**: 219. 1897.

Meadows and moist ground along streams of the artemisia, pinyon, and yellow pine belts. British Columbia to California, eastward to Montana and Utah.

24. **Trifolium cyathiferum** Lindl. Bot. Reg. 13: sub *pl. 1070.* 1827.

Canyons and mountain sides of the artemisia, pinyon, and yellow pine belts. British Columbia and Idaho, southward to California and Nevada.

25. **Trifolium microcephalum** Pursh, Fl. Amer. Sept. 478. 1814.

Fields, canyons, and mountain sides of the pinyon, yellow pine, and aspen belts. Montana and British Columbia, southward to Nevada and Lower California.

26. **Trifolium fimbriatum** Lindl. Bot. Reg. 13: sub *pl. 1070.* 1827.

Trifolium spinulosum Dougl.; Hook. Fl. Bor. Amer. 1: 133. 1830.

Valleys and mountain sides of the artemisia, pinyon, and yellow pine belts. British Columbia to California and Nevada.

27. **Trifolium dubium** Sibth. "Fl. Oxon. 231. 1794."

Waste lands; introduced from Europe. Established in the Eastern States and locally in the Northwest and California.

7. LOTUS L.

Stipules foliaceous or scarious. Perennials; flowers in bracted pedunculate umbels.

Plants more or less silky-pubescent, 30 cm. high or more. Leaflets 5 or more, obovate to oblanceolate; corolla yellow and white; pod linear, 3 to 5 cm. long ---- 4. L. torreyi.

Plants glabrous, at least in age.

Flowers greenish yellow or purplish; pods thick, about 5 mm. broad, 5 cm. long. Leaflets 9 to 15, rhombic-ovate to obovate, obtuse, mucronate. 3. L. crassifolius.

Flowers yellow or whitish; pods slender.

Leaflets 3, oblong to oblanceolate, obtuse or acute; pod 15 to 25 mm. long. 1. L. tenuis.

Leaflets 5 to 9, obovate to oblong, obtuse or acutish; pod 4 to 5 cm. long. 2. L. bicolor.

Stipules glandlike.

Corolla small, equaling or slightly exceeding the calyx. Flowers subsessile or peduncled.

Leaflets oval or obovate, pubescent; pod broadly linear, 1 cm. long, 3-seeded; pubescent or villous annual with decumbent stems ---- 7. L. trispermus.

Leaflets (1 to 3) lance-oblong or narrower, silky-villous to glabrate; pod linear, straight, many-seeded; annual with erect or ascending stems, 30 to 50 cm. long ---- 8. L. americanus.

Corolla much surpassing the calyx.

Flowers mostly subsessile, often pedunculate. Pod 25 mm. long, strigose; strigose perennial with ascending stems; leaflets linear or linear-oblong ---- 6. L. wrightii.

Flowers pedunculate (the umbel or head often subtended by a 1 to 3-foliolate bract).

Peduncles elongate, much exceeding the leaves.

Plants diffusely branched, strigose, 20 to 30 cm. high; leaflets obovate to linear; peduncles 3 cm. long or more; pod straight, divaricate or reflexed, pubescent, 25 mm. long or more; bracts exceeding the calyx ---- 9. L. longebracteatus.

Plants suffruticose, erect or decumbent, 30 to 60 cm. high; leaflets cuneate-oblanceolate, more or less pubescent; peduncles 6 to 12 cm. long; pod erect, straight, 3 to 4 mm. wide, 3 cm. long or more; bracts shorter than the calyx_____5. L. argensis.

Peduncles rarely exceeding the leaves, except in No. 10.

Peduncles commonly 1-flowered. Calyx teeth subulate, 3 mm. long; corolla light yellow; pod 15 to 20 mm. long, strigose; plants 10 to 20 cm. high, with numerous, often prostrate stems; leaflets obovate to linear-oblong, grayish-pubescent__10. L. nummularius.

Peduncles 3 to 10-flowered. Corolla yellow, turning purple; pods 15 mm. long (including the beak), curved; cespitose perennials with ascending or procumbent stems.

Calyx teeth equaling the tube; leaflets obovate, villous.
11. L. douglasii.

Calyx teeth half as long as the tube; leaflets obovate to oblanceolate, villous_____12. L. nevadensis.

1. Lotus tenuis Waldst. & Kit.; Willd. Enum. Pl. 797. 1809.
Lotus macbridei A. Nels. Bot. Gaz. 53: 221. 1912.
In fields; Idaho. Introduced from Europe.

2. Lotus bicolor (Dougl.) Frye & Rigg, Northw. Fl. 234. 1912.
Hosackia bicolor Dougl. in Lindl. Bot. Reg. 15: *pl.* 1257. 1829.
Wet meadows; Sierra Nevada. British Columbia and Idaho, southward to California and Nevada .

3. Lotus crassifolius (Benth.) Greene, Pittonia 2: 147. 1890.
Hosackia crassifolia Benth. Trans. Linn. Soc. 17: 365. 1836.
Meadows and canyons, on mountain sides and yellow pine areas. Washington to California and adjacent Nevada.

4. Lotus torreyi (A. Gray) Greene, Pittonia 2: 146. 1890.
Hosackia torreyi A. Gray, Proc. Amer. Acad. 8: 625. 1873.
Canyons and wooded mountain sides; Sierra Nevada. Oregon, California, and Nevada.

5. Lotus argensis Coville, Contr. U. S. Nat. Herb. 4: 83. 1893.
Rocky canyons and mountain sides of the lower artemisia and Covillea belts. Southwestern Utah and Nevada, Arizona, and southern California.

6. Lotus wrightii (A. Gray) Greene, Pittonia 2: 143. 1890.
Hosackia wrightii A. Gray, Pl. Wright. 2: 42. 1853.
Canyons and rocky hillsides. Southern Colorado, New Mexico, Arizona, and Mexico.

7. Lotus trispermus Greene, Erythea 1: 258. 1893.
Desert areas and dry hillsides of the Covillea and artemisia belts. Southern Utah, Nevada, Arizona, and southern California.

8. Lotus americanus (Nutt.) Bisch. Linnaea 14: Litt. 132. 1840.
Trigonella americana Nutt. Gen. Pl. 2: 120. 1818.
Meadows and mountain parks of the artemisia, pinyon, and yellow pine belts. Minnesota to Washington, southward to Arkansas, Texas, and Mexico.

9. Lotus longebracteatus Rydb. Bull. Torrey Club 30: 254. 1903.
Hillsides of the artemisia belt. Southern Utah, Arizona, and Nevada.

10. Lotus nummularius (Jones) Tidestrom.
Hosackia rigida nummularia Jones, Proc. Calif. Acad. II. 5: 633. 1895.
Covillea and artemisia belts. Utah, Arizona, and New Mexico.

11. Lotus douglasii Greene, Pittonia **2**: 149. 1890.

Hosackia decumbons Benth. Bot. Reg. **15**: sub *pl. 1257*. 1829. Not *Lotus decumbens* Poir. 1813.

Gravelly yellow pine areas. Washington and Idaho to Nevada and California.

12. Lotus nevadensis (S. Wats.) Greene, Pittonia **2**: 149. 1890.

Hosackia decumbens nevadensis S. Wats. Bot. Calif. **1**: 138. 1876.

Meadows and canyons of the artemisia and yellow pine belts. California and western Nevada.

8. PSORALEA L. Scurf-pea

Stem leaves reduced to scales, the basal with lanceolate leaflets 2 to 3 cm. long.
  Flowers in interrupted spikes; calyx canescent, the upper teeth rounded, the lower acute; corolla dark blue, 5 mm. long; stem 1 meter high or less, with virgate strigose branches ..... 1. P. juncea.
Stem leaves not reduced to scales.
  Leaflets narrowly linear to linear-oblong. Stems 30 cm. high or more, strigose and gland-dotted; corolla 4 to 5 mm. long.
    Racemes short, spikelike; calyx lobes rounded-oval ..... 2. P. micrantha.
    Racemes elongated, interrupted; calyx lobes acute ..... 6. P. stenophylla.
  Leaflets spatulate to broadly obovate.
    Plants with short stems and grayish or whitish pubescence; roots long, tuberous; leaves long-petioled; flowers in spikes.
      Leaflets obovate, 1 to 3 cm. long. Calyx campanulate, with subulate teeth; corolla about 2 cm. long ..... 7. P. megalantha.
      Leaflets broadly obovate or rhombic-ovate, rounded or retuse, 3 to 4 cm. long. Corolla 10 to 12 mm. long.
        Lowest calyx tooth spatulate or obovate, the upper ones subulate, attenuate ..... 8. P. castorea.
        Lowest calyx tooth lanceolate, the upper ones subulate. 9. P. mephitica.
    Plants tall and branching; roots not tuberous; leaves short-petioled; flowers racemose.
      Racemes short, dense. Leaflets spatulate or obovate, 1.5 to 4 cm. long, retuse, rounded, or acute; calyx 2 mm. long, the lobes very short; corolla 5 to 6 mm. long; fruit long-villous ..... 3. P. purshii.
      Racems interrupted, lax.
        Leaflets oblanceolate, 1 to 5 cm. long; calyx 2 mm. long, strigose, the teeth triangular; corolla 4 mm. long ..... 4. P. stenostachys.
        Leaflets broadly oblanceolate to obovate, 1 to 3 cm. long; calyx 3 mm. long, the teeth lanceolate, equaling the tube; corolla 6 mm. long. 5. P. bigelovii.

1. Psoralea juncea Eastw. Proc. Calif. Acad. II. **6**: 286. 1897.

Sandy places of the artemisia belt. Southeastern Utah.

2. Psoralea micrantha A. Gray in U. S. Rep. Expl. Miss. Pacif. **4**: 77. 1857.

Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Oklahoma and Texas, westward to southern Utah and Arizona.

3. Psoralea purshii Vail, Bull. Torrey Club **21**: 94. 1894.

Desert areas and hillsides of the artemisia belt. Idaho and Washington to Nevada.

4. Psoralea stenostachys Rydb. Bull. Torrey Club **40:** 46. 1913.
Sandy soil of the artemisia belt. Utah.

5. Psoralea bigelovii (Rydb.) Tidestrom.
Psoralidium bigelovii Rydb. N. Amer. Fl. **24:** 15. 1919.
Grand Canyon, Arizona. Western Texas and southern Colorado to Arizona and Sonora.

6. Psoralea stenophylla Rydb. Bull. Torrey Club **40:** 46. 1913.
Sandy river banks of the artemisia belt. Utah.

7. Psoralea megalantha Woot. & Standl. Contr. U. S. Nat. Herb. **16:** 140. 1913.
Artemisia and pinyon belts. New Mexico, western Colorado, and eastern Utah.

8. Psoralea castorea S. Wats. Proc. Amer. Acad. **14:** 291. 1879.
Valleys and hillsides of the Covillea and artemisia belts. Southern Utah, Arizona, and southern California.

9. Psoralea mephitica S. Wats. Proc. Amer. Acad. **14:** 291. 1879.
Upper Covillea and artemisia belts. Southern Utah and Arizona.

9. PAROSELA Cav.

Plant a glabrous shrub, 30 to 60 cm. high. Branches divaricate; leaflets 9 to 13, cuneate-oblong, 2 to 4 mm. long; flowers in a short spike, reddish purple; calyx with long filiform plumose teeth----------**10. P. formosa.**
Plants perennials or shrubs.
Leaves simple, cuneate-oblong to nearly linear, 8 to 20 mm. long, early deciduous. Flowers in a loose spike, purple; calyx conspicuously glandular, the teeth ovate, obtuse, shorter than the tube; spinescent shrub, 1 to 5 meters high, the branches silvery----------**6. P. spinosa.**
Leaves pinnate.
Plants 8 to 15 cm. high, herbaceous. Leaflets 6 to 13, cuneate-oblong or obcordate, 5 to 8 mm. long; flowers crowded in a short spike, white or rose-colored; calyx villous, the plumose teeth longer than the tube. **9. P. mollis.**
Plants 20 cm. high or more, herbs or shrubs.
Stems, branches, and leaves yellowish green, sparingly strigose. Branches spinulose; leaflets 2 to 7, oblong, obtuse, 4 to 10 mm. long; flowers scattered, purple; calyx pubescent, the teeth acute or acuminate, equaling the tube----------**1. P. kingii.**
Stems not yellowish green.
Leaflets 7 to 21, 2 to 4 mm. long, obovate, often emarginate.
Plant a densely glandular, divaricately branching shrub, 0.6 to 1.6 meters high; flowers violet, in short spikes; calyx teeth equaling the tube----------**7. P. polyadenia.**
Plant a glandular herbaceous perennial with ascending branches; flowers small, bright purple, in an elongate raceme; calyx teeth broad, shorter than the tube----------**8. P. parryi.**
Leaflets 5 to 15 mm. long. Branches with whitish bark.
Leaflets 5 to 7, obovate or oval, 5 to 8 mm. long; flowers purple, in an elongate raceme. Calyx teeth dissimilar, equaling the tube----------**2. P. wheeleri.**
Leaflets linear, linear-oblanceolate, or narrowly oblong; flowers racemose.

Leaflets 1 to 7, narrowly oblong, silvery-canescent or strigose. Flowers indigo-blue; calyx teeth broad, shorter than the tube----------3. **P. fremontii.**
Leaflets linear to linear-oblanceolate.
Leaflets 8 to 15 mm. long; flowers deep purple; calyx teeth dissimilar, shorter than the tube----------4. **P. johnsoni.**
Leaflets 6 to 8 mm. long; flowers bluish purple; calyx teeth similar, equaling the tube----------5. **P. amoena.**

1. Parosela kingii (S. Wats.) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.
Dalea kingii S. Wats. in King, Geol. Expl. 40th Par. **5**: 64. *pl. 10. f. 1–3*. 1871.
Mountain sides and canyons of the artemisia and yellow pine belts. Nevada.

2. Parosela wheeleri Vail, Bull. Torrey Club **24**: 17. 1897.
Valleys and plains of the artemisia belt. Nevada and southern California.

3. Parosela fremontii (Torr.) Vail, Bull, Torrey Club **24**: 16. 1897.
Dalea fremontii Torr.; A. Gray, Mem. Amer. Acad. n. ser. **5**: 316. 1854.
Rocky hillsides of the Covillea belt. Southern Utah to southeastern California.

4. Parosela johnsoni (S. Wats.) Vail, Bull. Torrey Club **24**: 17. 1897.
Dalea johnsoni S. Wats. in King, Geol. Expl. 40th Par. **5**: 64. 1871.
Psorodendron pubescens Rydb. N. Amer. Fl. **24**: 44. 1919.
Sandy places and hillsides of the Covillea belt. Southern Utah, northern Arizona, and southeastern California.

5. Parosela amoena (S. Wats.) Vail, Bull. Torrey Club **24**: 17. 1897.
Dalea amoena S. Wats. Amer. Nat. **7**: 300. 1873.
Hillsides of the Covillea and lower artemisia belts. Southern Utah, Arizona, and southern Nevada. A doubtful species, perhaps too closely related to the preceding to merit recognition.

6. Parosela spinosa (A. Gray) Heller, Cat. N. Amer. Pl. ed. 2. 7. 1900.
Dalea spinosa A. Gray, Pl. Thurb. 315. 1855.
Desert areas and hillsides of the Covillea belt; Needles, California. Arizona and southern California.

7. Parosela polyadenia (Torr.) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.
Dalea polyadenia Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 64. 1871.
Plains and hillsides of the artemisia belt. Western Nevada and southern California.

8. Parosela parryi (Torr. & Gray) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.
Dalea parryi Torr. & Gray; A. Gray, Proc. Amer. Acad. **7**: 397. 1868.
Desert areas and hillsides of the Covillea belt; Needles, California. Arizona and southern California.

9. Parosela mollis (Benth.) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.
Dalea mollis Benth. Pl. Hartw. 306. 1848.
Desert areas and canyons of the Covillea belt. Southern Nevada, Arizona, and southern California.

10. Parosela formosa (Torr.) Vail, Trans. N. Y. Acad. **14**: 34. 1894.
Dalea formosa Torr. Ann. Lyc. N. Y. **2**: 177. 1828.
Rocky hillsides of the Covillea and lower artemisia belts. Colorado and Utah to Texas and Arizona.

10. PETALOSTEMON Michx. Prairieclover

Corolla white or yellowish. Stem glabrous, conspicuously gland-dotted, 30 cm. high; leaflets 3 to 5, oblong, obtuse; spikes 25 to 45 mm. long, long-pedunculate; calyx villous; pod densely villous_____1. **P. flavescens.**

Corolla rose-colored, purple, or bluish. Stems 30 to 60 cm. high, more or less branched from base; calyx villous.

Spikes oblong, 15 mm. thick or more. Leaflets mostly 5, obovate or elliptic_____2. **P. ornatus.**

Spikes cylindric, mostly 10 mm. thick or less.

Floral bracts lanceolate to rhombic-lanceolate; leaflets oblong or oblanceolate, 10 to 15 mm. long_____3. **P. searlsiae.**

Floral bracts broadly obovate, short-acuminate; leaflets oblong or linear-oblong, about 10 mm. long_____4. **P. rothrockii.**

1. Petalostemon flavescens S. Wats. Amer. Nat. **7**: 299. 1873.

Rocky hillsides of the artemisia and pinyon belts. Utah.

2. Petalostemon ornatus Dougl.; Hook. Fl. Bor. Amer. **1**: 138. 1830.

Prairies and hillsides of the artemisia and yellow pine belts. Washington and Idaho to Nevada.

3. Petalostemon searlsiae A. Gray, Proc. Amer. Acad. **8**: 380. 1873.

Artemisia and pinyon belts. Southern Utah, Arizona, and Nevada.

4. Petalostemon rothrockii Rydb. N. Amer. Fl. **24**: 134. 1920.

Artemisia and pinyon belts. Southern Utah and Arizona.

11. ROBINIA L. Locust

Branches, leaves, and fruit glabrous; calyx puberulent, the teeth triangular; flowers white; pods about 6 cm. long, 8 mm. wide_____1. **R. pseudoacacia.**

Branches, leaves, and fruit pubescent or glandular-hispid; calyx glandular-hispid, the teeth triangular; flowers rose-colored; pods 5 to 8 cm. long, about 1 cm. wide_____2. **R. neomexicana.**

1. Robinia pseudoacacia L. Sp. Pl. 722. 1753. Black locust.

In cultivation. Pennsylvania to Georgia, westward to Oklahoma.

2. Robinia neomexicana A. Gray, Mem. Amer. Acad. n. ser. **5**: 314. 1854.

Canyons of the pinyon and yellow pine belts; Kaibab Plateau. Colorado and New Mexico, westward to Nevada.

12. PETERIA A. Gray

Calyx teeth triangular-lanceolate, about 5 mm. long, the midrib prominent; corolla 15 to 20 mm. long; pod about 5 cm. long; leaflets oval or obovate. **2. P. thompsonae.**

Calyx teeth linear-subulate, 5 to 7 mm. long, the midrib obscure; corolla about 15 mm. long; pod 7 cm. long, 5 mm. wide; leaflets oval or elliptic. **1. P. nevadensis.**

1. Peteria nevadensis Tidestrom, Proc. Biol. Soc. Washington **36**: 183. 1923.

Canyons and slopes of the artemisia and pinyon belts. Nevada.

2. Peteria thompsonae S. Wats. Amer. Nat. **7**: 300. 1873.

Rocky cliffs of the artemisia and pinyon belts. Southern Utah.

13. ASTRAGALUS L. MILKVETCH

KEY TO THE SUBGENERA

(For key based on floral and leaf characters see below)

Pods 2-celled.
  Pods papery, inflated---2. Diphysus.
  Pods not papery or inflated.
    Pods coriaceous or woody---3. Euastragalus.
    Pods membranous, flattened---4. Hamosa.
Pods 1-celled, with or without a rudimentary or partial partition.
  Pods papery, inflated---1. Phaca.
  Pods chartaceous or coriaceous, not inflated.
    Lower suture strongly intruded---5. Tium.
    Lower suture not intruded or only slightly so.
      Pods more or less stipitate.
        Pods with 2 grooves on the upper side---6. Diholcos.
        Pods without grooves on the upper side.
          Leaves simple---7. Jonesiella.
          Leaves pinnate.
            Partial partition wanting---14. Homalobus.
            Partial partition present.
              Pods not flattened---8. Rydbergiella.
              Pods decidedly flattened---13. Atelophragma.
Pods sessile.
  Pods winged---12. Pterophacos.
  Pods not winged.
    Leaflets with spinulose tips---15. Kentrophyta.
    Leaflets at most mucronate.
      Pods membranous---14. Homalobus.
      Pods chartaceous or woody.
        Pods with fleshy epicarp, cross-ribbed. Leaflets narrow.
          9. Ctenophyllum.
        Pods without a fleshy epicarp.
          Calyx campanulate, small. Stipules united.
            10. Cnemidophacos.
          Calyx cylindrical, large---11. Xylophacos.

KEY TO THE SUBGENERA (IN SOME CASES TO THE SPECIES) BASED ON FLORAL AND LEAF CHARACTERS

Leaves simple---A. (p. 309).
Leaves compound.
  Leaflets spinulose, subulate to linear-lanceolate. Flowers small; pods 1 or 2-seeded; diffusely branched, mostly trailing perennials.
    15. Kentrophyta.
  Leaflets not spinulose, at most mucronate.
    Calyx cylindric, 9 to 20 mm. long. Flowers large---B. (p. 309).
Calyx 2 to 8 mm. long, mostly campanulate.
  Calyx teeth nearly equaling or exceeding the tube---C. (p. 310).
  Calyx teeth shorter than the tube.
    Flowers white, 1 to 4, in nearly sessile clusters---5. A. lutosus.

Flowers in pedunculate racemes.
Plants nearly acaulescent, low, silvery white_____4. Hamosa.
Plants mostly caulescent.
Stipules united, forming a sheath. Corolla yellow or purple.
10. Cnemidophacos.
Stipules (except the lowest) not forming sheaths_____D (p. 310).

A. LEAVES SIMPLE; STIPULES FREE

Plants low, cespitose, silky-canescent. Flowers small_____14. Homalobus.
Plants not cespitose.
Plants rushlike_____1. Phaca.
Plants not rushlike. Leaves ovate-orbicular, cordate, 3 to 5 cm. long; flowers large, ochroleucous; pod stipitate, ovoid, 2 cm. long or more, 3-celled.
7. Jonesiella.

B. LEAVES PINNATE; CALYX CYLINDRIC, 9 TO 20 MM. LONG; FLOWERS LARGE

Plants rushlike, 30 to 50 cm. high, glabrous or strigose; leaflets linear-oblong
Calyx teeth one-third as long as tube or shorter.
Pods long-stipitate, flattened; corolla ochroleucous_____14. Homalobus.
Pods sessile; corolla purple or white.
Pods flattened, winged_____12. Pterophacos.
Pods neither perceptibly flattened nor winged_____9. Ctenophyllum.
Plants not rushlike; leaflets linear-lanceolate or broader.
Plants green, glabrous or sparingly pubescent, 15 to 60 cm. high or more.
Calyx mostly white-hairy, the teeth 1 to 3 mm. long_____14. Homalobus.
Calyx black-hairy or with black and white hairs mixed.
Calyx teeth blunt, about 1 mm. long. Pod coiled, strigose.
116. A. speirocarpus.

Calyx teeth 2 to 3 mm. long.
Calyx tube about 8 mm. long.
Plant low, cespitose; inflorescence shorter than the leaves.
13. A. megacarpus.

Plants robust, not cespitose; inflorescence surpassing the leaves.
8. Rydbergiella.

Calyx tube 5 to 6 mm. long. Plants somewhat pubescent or glabrous.
Corolla purple_____39. A. goniatus.
Corolla ochroleucous.
Calyx glabrous; leaflets elliptic to rounded_____1. Phaca.
Calyx pubescent; leaflets elliptic to oblong_____53. A. scopulorum.
Plants pubescent to tomentose.
Calyx 20 mm. long, reddish. Corolla red or purple_____77. A. coccineus.
Calyx 9 to 20 mm. long, not reddish.
Racemes oblong, dense, many-flowered, long-pedunculate.
Ovary and pod sessile.
Calyx dark-villous_____4. Hamosa.
Calyx white-villous_____3. Euastragalus.
Ovary and pod stipitate_____14. Homalobus.
Racemes short, dense, few to many-flowered, often elongating in fruit.
Tomentose or pubescent perennials_____11. Xylophacos.

C. LEAVES PINNATE; CALYX 2 TO 8 MM. LONG, THE TEETH NEARLY EQUALING THE TUBE

Calyx black-hairy or with black and white hairs mixed.
Plants green or grayish.
Ovary and pod sessile---1. Phaca.
Ovary and pod stipitate---93. A. aboriginum.
Plants silvery-pubescent, cespitose.
Corolla purple---24. A. sesquiflorus.
Corolla ochroleucous, often tipped with purple.
Leaflets linear---98. A. panamintensis.
Leaflets oval---25. A. platytropis.
Calyx without black hairs.
Leaflets glabrous or sparingly strigose above, linear-oblong to oblanceolate.
Leaflets obtuse.
Calyx 4 mm. long, strigose---3. A. allochrous.
Calyx 7 to 8 mm. long, glabrous---10. A. oophorus.
Leaflets acute.
Corolla violet---55. A. humistratus.
Corolla ochroleucous---13. Atelophragma.
Leaflets decidedly strigose or grayish-pubescent, oblong or obovate.
Leaflets obtuse.
Stems ascending, white-pubescent---23. A. sabulonum.
Stems prostrate, sparingly strigose---46. A. nuttallianus trichocarpus.
Leaflets acute or mucronate.
Leaflets oblong, oblanceolate or broader.
Plant low, silvery-strigose---25. A. platytropis.
Plant tall, woolly-pubescent---43. A. andersonii.
Leaflets linear---67. A. argillosus.

D. LEAVES PINNATE; CALYX 2 TO 8 MM. LONG, THE TEETH SHORTER THAN THE TUBE

Calyx 2.5 mm. long or less.
Plant low, pulvinate-cespitose; leaflets small, linear---19. A. jejunus.
Plant tall; leaflets linear-oblong, about 1 cm. long, mostly glabrous above.
102. A. wingatanus.
Calyx 3 to 8 mm. long.
Calyx commonly without black hairs.
Corolla purple or purplish.
Plants rushlike. Leaflets few, linear---111. A. episcopus.
Plants not rushlike.
Plants prostrate, grayish-pubescent.
Leaflets 11 or 13, small, rounded---17. A. serpens.
Leaflets oblong to obovate---46. A. nuttallianus trichocarpus.
Plants with erect or ascending stems.
Plant hoary-pubescent throughout---26. A. coulteri.
Plants grayish-strigose or pubescent.
Stems numerous, 20 cm. high or less; leaflets oblong or elliptic.
11. A. whitneyi.
Stems few, 30 cm. high or more; leaflets oblong to oblanceolate---113. A. flexuosus.

Corolla ochroleucous or white, often purple-tipped.
Calyx 6 to 8 mm. long.
Stems hoary or silvery-pubescent.
Plant with erect stems_____27. A. fremontii.
Plant matted, low_____81. A. cymboides.
Stems glabrous or nearly so.
Ovary and pod stipitate; leaflets obovate, emarginate__9. A. artipes.
Ovary and pod sessile; leaflets oblong to obovate, rounded or emarginate.
Racemes equaling or shorter than the leaves___29. A. araneosus.
Racemes much surpassing the leaves_____59. A. sabulosus.
Calyx 3 to 5 mm long.
Racemes equaling or shorter than the leaves.
Leaflets obovate-oblong, emarginate; stems prostrate.
18. A. sileranus.
Leaflets linear to oval, rounded or emarginate; stems erect.
Stem 20 cm. high or more. Leaflets 6 to 10 mm. long, cinereous.
16. A. subcinereus.
Stems about 10 cm. high.
Plant annual; leaflets linear to oblong, sparingly strigose.
8. A. geyeri.
Plant perennial; leaflets oblong to obovate, pubescent
22. A. pubentissimus.
Racemes much longer than the leaves.
Flowers in a dense spike (elongating in fruit; leaflets oblong, rounded, 10 to 20 mm. long. Plants tall_____15. A. hornii.
Flowers loosely racemose; leaflets linear, distant.
Leaflets 1 to 9, linear or subulate; calyx teeth minute; plant rushlike_____107. A. diversifolius.
Leaflets 9 to 11; calyx teeth 1 mm. long; plant cespitose.
94. A. brandegei.
Calyx black-hairy or with black and white hairs mixed.
Calyx 2 to 3 mm. long (rarely longer).
Leaflets approximate, commonly longer than the internodes, linear to oblong.
Plant prostrate, silvery-pubescent. Leaflets small, rounded.
17. A. serpens.
Plants tall, erect or ascending, green. Leaflets 5 to 15 mm. long.
Racemes much longer than the leaves_____54. A. rusbyi.
Racemes scarcely exceeding the leaves_____103. A. tenellus.
Leaflets distant, commonly shorter than the internodes. Plants rushlike.
Plant silvery-strigose_____7. A. ceramicus.
Plants sparingly strigose to glabrate.
Leaflets 13 to 19, oblong, glabrous above_____48. A. straturensis.
Leaflets 1 to 7, linear-subulate to elliptic.
Terminal leaflet of upper leaves 25 to 40 mm___92. A. ibapensis.
Terminal leaflet of leaves 10 to 20 mm. long___108. A. garrettii.
Calyx 4 to 9 mm. long.
Calyx 7 to 9 mm. long.
Corolla purple or purple and white.

Leaflets linear to linear-oblanceolate, numerous, distant, equaling or shorter than the internodes.
Plant glabrous; leaflets rarely over 12 mm. long.
4. A. eastwoodae.
Plant strigose; leaflets 10 to 25 mm. long 72. A. casei.
Leaflets oblong or broader. Plants glabrous or sparingly strigose.
Plant glabrous. Leaflets rhombic-obovate, rounded or retuse.
21. A. artemisiarum.
Plants pubescent or strigose.
Plant subacaulescent, grayish or silvery 45. A. layneae.
Plants caulescent.
Calyx densely black-hairy. Leaflets oval, emarginate.
71. A. cibarius.
Calyx sparingly black-hairy to glabrous.
Leaflets oblong or elliptic, rounded or retuse.
28. A. diphysus.
Leaflets obovate or elliptic, mostly retuse, often rounded.
38. A. palans.
Corolla ochroleucous or white.
Calyx teeth 2.5 to 3 mm. long.
Plant green, glabrous or nearly so.
Plant 10 to 20 cm. high, cespitose 20. A. beckwithii.
Plants taller, few-stemmed 8. Rydbergiella.
Plant villous 52. A. drummondii.
Calyx teeth 1 to 2 mm. long.
Racemes scarcely if at all surpassing the leaves. Leaflets obovate or oval, strigose or glabrate 29. A. araneosus.
Racemes much surpassing the leaves. Plants with long leafy stems; leaflets oblong to obovate, obtuse.
Racemes lax. Pods long-stipitate 49. A. eremiticus.
Racemes spikelike 3. Euastragalus.
Calyx 4 to 6 mm. long.
Calyx about 4 mm. long.
Leaflets 5 to 10 mm. long, distant, oblong or oval, sparingly strigose; plant rushlike 50. A. obscurus.
Leaflets 10 to 30 mm. long, linear to oval; plants green.
Racemes equaling or slightly exceeding the leaves.
14. Homalobus.
Racemes long-pedunculate, much exceeding the leaves.
Leaflets linear to elliptic, 6 mm. long or less; plant low. Calyx densely black-hairy 109. A. carltonii.
Leaflets oblong to obovate, 5 to 20 mm. long; plants 20 to 30 cm. high.
Leaflets obovate, emarginate 37. A. ursinus.
Leaflets oblong or oval 97. A. occidentalis.
Calyx 5 to 6 mm. long.
Racemes equaling or slightly surpassing the leaves.
Calyx teeth 1 mm. long. Flowers purplish; leaflets 7 to 11, obovate, emarginate, glabrous above 1. A. ampullarius.
Calyx teeth 1.5 mm. long or more.
Corolla about 16 mm. long, purplish or ochroleucous. Leaflets obovate to orbicular 70. A. iodanthus.

Corolla 8 to 14 mm. long.
Leaflets cuneate-obovate, emarginate; corolla white.
2. A. wetherillii.
Leaflets elliptic to obcordate; corolla ochroleucous.
Ovary and pod stipitate---12. A. hookerianus.
Ovary and pod sessile.
Corolla 8 to 10 mm. long---30. A. lentiginosus.
Corolla 12 to 14 mm. long---2. Diphysus.
Racemes long-pedunculate, much exceeding the leaves.
Plant low, cespitose, strigose. Leaflets oval to narrowly lanceolate---56. A. desperatus.
Plants with elongate stems 20 cm. long or more.
Leaflets broadly obovate or elliptic.
Leaflets glabrous. retuse---114. A. porrectus.
Leaflets silvery-strigose, rounded---38a. A. mohavensis.
Leaflets narrower.
Calyx teeth about 1 mm. long. Leaflets narrow, distant.
Corolla purple---112. A. coltoni.
Corolla ochroleucous or white tipped with purple.
110. A. stenophyllus.

Calyx teeth 1.5 to 2 mm. long.
Leaflets linear, distant, shorter than the internodes.
5. Tium.
Leaflets approximate, usually longer than the internodes.
Racemes short and dense in flower, elongating in fruit.
Corolla ochroleucous; leaflets linear-oblong to elliptic.
Leaflets elliptic-oblong, retuse, glabrous above.
40. A. accidens.
Leaflets linear-oblong, acute, pubescent.
93. A. aboriginum.
Corolla purple; leaflets elliptic to cuneate-oblong.
104. A. debilis.
Racemes elongate, many-flowered. Leaflets linear to elliptic; flowers white or purplish.
Corolla 7 to 10 mm. long. Pod stipilate, oblong, deeply 2-grooved---57. A. haydenianus.
Corolla 12 to 15 mm. long.
Leaflets linear-oblong to oval---51. A. arrectus.
Leaflets oblong or obovate, emarginate or rounded.
Ovary and pod sessile---2. Diphysus.
Ovary and pod stipitate---40. A. accidens.

1. Phaca. Pods 1-celled, papery, inflated.

Lateral leaflets linear or filiform, few or wanting, the terminal linear, scarcely flattened. Calyx campanulate, strigose, 4 mm. long; corolla ochroleucous; pod elliptic, mottled, 1 to 2 cm. long; rushlike strigose perennial.
7. A. ceramicus.

Lateral leaflets 2 to 12 pairs.
Plants low, pulvinate, cespitose. Leaves 1 to 3 cm. long, puberulent, the leaflets 11 to 15, linear, 2 to 4 mm. long; calyx 2 mm. long; corolla purple; pod ovoid, mottled, puberulent, 10 mm. long---19. A. jejunus.

Plants commonly 10 cm. high or more, few-stemmed or cespitose.
Plants glabrous or nearly so, at least below.
Calyx 4 to 5 mm. long, black-hairy, the teeth nearly equaling the tube.
Corolla white or cream-colored or often pink or purple, 8 mm. long; pod ovoid, stipitate, the body 2 cm. long.
Leaflets oval or obovate, rounded or retuse, 5 to 10 mm. long; pod strigose---------- **2. A. wetherillii.**
Leaflets oblong, obtuse or retuse, 6 to 12 mm. long; pod glabrous. **14. A. wardii.**
Calyx 6 to 10 mm. long. Margin and midrib of leaflets often strigulose.
Calyx teeth one-third as long as the tube or shorter.
Leaflets linear to oblanceolate, about 21, 4 to 10 mm. long; corolla purple; pod ovoid, stipitate, glabrous, the body about 2 cm. long---------- **4. A. eastwoodae.**
Leaflets rhombic-obovate, rounded or retuse, 8 to 12 mm. long; corolla purple, 18 mm. long; pod lance-oblong, stipitate, incurved, the cross-section obcordate, the body about 2 cm. long---------- **21. A. artemisiarum.**
Calyx teeth half as long as the tube or nearly so. Corolla white or ochroleucous, purple-tipped.
Leaflets ovate to elliptic, 10 to 20 mm. long, rounded or retuse. Pod ovate, stipitate, the body 2 to 3 cm. long, glabrous. **10. A. oophorus.**
Leaflets obovate to oblong, 6 to 12 mm. long, rounded or retuse.
Corolla 15 mm. long; pod ovoid, mottled, stipitate, the body about 3 cm. long---------- **9. A. artipes.**
Corolla 18 to 20 mm. long; pod lance-oblong, stipitate, incurved, the cross-section obcordate, the body about 2 cm. long. **20. A. beckwithii.**
Plants more or less strigose or pubescent.
Plant cespitose, perennial with numerous stems 10 cm. high or less.
Leaves 2 to 3 cm. long, the leaflets 5 to 11, linear-lanceolate, 5 to 8 mm. long; calyx 5 mm. long, the teeth equaling the tube; corolla purple; pod oblong, curved, mottled, strigose, 10 mm. long. **24. A. sesquiflorus.**
Plants erect, ascending, or decumbent, annual or perennial.
Calyx 2 to 3 mm. long.
Leaflets linear to oblong, 5 to 15 mm. long. Corolla ochroleucous, 5 mm. long; pods ovoid, strigose, 15 mm. long, lunate. **8. A. geyeri.**
Leaflets oblanceolate to elliptic or obovate.
Pubescence loose, spreading; leaflets emarginate, glabrous or nearly so above; corolla ochroleucous, tipped with purple; pod globose, mottled, pubescent, 12 to 15 mm. long. **18. A. sileranus.**
Pubescence mostly appressed; leaflets rounded; corolla purple; pod oval, 13 to 16 mm. long, short-stipitate, mottled. **17. A. serpens.**
Calyx 4 to 10 mm. long.
Calyx teeth minute, 1 mm. long or less.
Leaflets 7 to 11, obovate, 8 to 12 mm. long, emarginate, glabrous above. Calyx 6 mm. long, black-hairy; corolla purplish; pod elliptic, about 15 mm. long, on a stipe 15 to 18 mm. long. **1. A. ampullarius.**

Leaflets 13 to 21, linear or oblong, 6 to 10 mm. long, cinereous. Peduncles equaling or shorter than the leaves; plants low and tufted, appressed-pubescent.
Corolla greenish, tipped with purple; pod globose-ovoid, sessile, puberulent, 15 to 20 mm. long----------16. A. subcinereus.
Corolla red-violet; pod oval, 2 cm. long or less, mottled, glabrous, the stipe equaling the calyx----------11. A. whitneyi.

Calyx teeth 1.5 mm. long or more.
Leaflets rounded, obovate, or oval.
Plants low, the stem very short; leaflets 9 to 13, emarginate, green. Peduncles shorter than the leaves; corolla ochroleucous; pod ovate-oblong, acuminate, strigose, about 4 cm. long----------13. A. megacarpus.
Plants with leafy stems, 10 cm. high or more; leaflets 21 to 25. Flowers white, few, in a nearly sessile axillary head; pod stipitate, ovate or ovate-oblong, sulcate, 2.5 to 3 cm. long. 5. A. lutosus.

Leaflets linear to oblong, 7 to 19 or more.
Peduncles twice longer than the leaves, dense-flowered. Plants robust, pubescent; leaflets oblong, 10 to 20 mm. long; corolla ochroleucous; pod ovate, acuminate, nearly glabrous, 10 to 15 mm. long----------15. A. hornii.
Peduncles shorter than, equaling, or somewhat exceeding the leaves.
Calyx more or less black-hairy. Corolla ochroleucous.
Leaflets 7 to 15, linear. Pod elliptic, mottled, 1 to 2 cm. long----------7. A. ceramicus.
Leaflets oblong.
Pod sessile, oval, 2.5 to 3.5 cm. long, glabrous.
Calyx teeth one-third as long as the tube. 6. A. tejonensis.
Calyx teeth nearly equaling the tube--3. A. allochrous.
Pod stipitate, obovoid, mottled, glabrous, 2 to 3 cm. long. 12. A. hookerianus.

Calyx without black hairs.
Corolla 10 to 12 mm. long, purplish or ochroleucous. Pod ellipsoid, strigose, 25 to 35 mm. long, the stipe equaling the calyx; leaflets strigose, 8 to 10 mm. long. 3. A. allochrous.
Corolla 6 to 8 mm. long, ochroleucous, often tipped with purple.
Plant hirsute-canescent, annual; corolla 6 mm. long; pod obliquely ovoid, about 10 mm. long or more, hirsute. 23. A. sabulonum.
Plant pubescent, perennial; corolla 8 mm. long; pod obliquely ovoid, curved, about 10 mm. long, silky-hirsute----------22. A. pubentissimus.

2. **Diphysus.** Pods 2-celled, papery, inflated.

Plants 15 cm. high or less, strigose. Leaflets 7 to 11, ovate to oblanceolate; calyx strigose, 5 mm. long, the teeth 2 mm. long; corolla white or yellowish, tipped with purple; pod ovoid, 2 to 3 cm. long, mottled. 25. A. platytropis.

Plants 20 to 50 cm. high.
Stems white, silky-strigose or pubescent, more or less flexuous. Leaflets 9 to 19, oblong to obovate, rounded or retuse; flowers in loose spikes.
Plants more or less hoary throughout; calyx cylindric, 7 mm. long, the slender teeth nearly equaling the tube; corolla purple; pod ovate-falcate, pubescent, mottled, 2 to 2.5 cm. long_____**26. A. coulteri.**
Stem hoary, the leaves loosely pubescent (at least above); calyx cylindric, 7 mm. long, the teeth about 2 mm. long; corolla ochroleucous, tipped with purple; pod 10 to 20 mm. long, glabrous or sparingly pubescent.
27. A. fremontii.
Stems glabrous to sparingly strigose.
Flowers purple, 15 mm. long; calyx cylindric, glabrous or strigose, the teeth half as long as the tube. Pod ovate, acuminate, 15 to 20 mm. long; leaflets oblong to elliptic, rounded or retuse__**28. A. diphysus.**
Flowers ochroleucous, often purple-tipped; calyx strigose.
Calyx with few scattered black hairs, the teeth one-third as long as the tube. Corolla about 12 mm. long; pod 2.5 cm. long, ovate, arcuate, long-beaked; leaflets obovate or oval, rounded or retuse.
29. A. araneosus.
Calyx with few or no black hairs, the teeth half as long as the tube or longer.
Corolla 8 to 9 mm. long; pod ovate-oblong, curved, about 2 cm. long, usually mottled; leaflets elliptic to obcordate_**30. A. lentiginosus.**
Corolla 12 to 14 mm. long; pod short-ovoid, slightly curved, about 2 cm. long; leaflets elliptic to obovate_____**31. A. heliophilus.**

3. Euastragalus. Pods 2-celled, coriaceous or woody.

Plants subscapose, white or grayish, villous or tomentose. Calyx 11 to 13 mm. long, the teeth 2 to 3 mm. long; corolla purple.
Pubescence rusty brown; racemes elongate; pod ovate-oblong, curved, densely villous, 15 mm. long; leaflets 15 to 25, broadly ovate or oval, 2 cm. long or less_____**32. A. bigelovii.**
Pubescence silvery white; racemes short; pod ovoid, densely villous, 12 to 18 mm. long; leaflets 11 to 31, oblong or obovate, retuse or rounded, 4 to 10 mm. long_____**33. A. thompsonae.**
Plants with elongate leafy stems.
Calyx 4 mm. long, the teeth very short. Corolla purplish or ochroleucous; pod oblong, slightly curved, about 10 mm. long; leaflets 11 to 15, obovate, emarginate, 8 to 10 mm. long, glabrous or nearly so; plants 30 cm. high or more, the stems flexuous_____**37. A. ursinus.**
Calyx 5 to 10 mm. long.
Corolla pink or purple, 12 to 15 mm. long. Calyx black-hairy, or with black and white hairs intermixed.
Leaflets 17 to 25, obovate or elliptic, mostly retuse, 6 to 15 mm. long, mostly glabrous; pod linear, curved, sulcate on both sides, 25 to 30 mm. long; stems 40 cm. high or less, glabrate_____**38. A. palans.**
Leaflets linear-oblong to elliptic, obtuse or retuse, strigose to glabrate; pod ovoid, 10 mm. long, villous; stems 10 to 20 cm. high.
39. A. goniatus.
Corolla ochroleucous or yellow. Inflorescence dense; plants robust, green.
Calyx white-hairy; corolla 12 mm. long. Pod oblong, 10 to 15 mm. long, glabrous; leaflets 15 to 25, mostly oblong, obtuse, strigose, 2 to 4 cm. long; floral bracts linear-lanceolate_____**34. A. carolinianus.**

Calyx black-hairy or with black and white hairs mixed; corolla 12 to 15 mm. long. Floral bracts lanceolate to ovate.

Ovary and pod stipitate. Leaflets ovate-oblong, emarginate, glabrous above; pod about 10 mm. long----------40. A. accidens.

Ovary and pod sessile.

Upper calyx teeth lanceolate, the lower subulate; pod cylindric, about 15 mm. long, sulcate; leaflets elliptic or oval, 15 to 35 mm. long, rounded or emarginate, strigose, often glabrate above. 35. A. mortoni.

Upper calyx teeth triangular, the lower subulate; pod cylindric, about 10 mm. long; leaflets oblong or oval, 10 to 25 mm. long, strigose or glabrate----------36. A. spicatus.

4. Hamosa. Pods 2-celled, membranous, flattened.

Plants nearly acaulescent. Cespitose perennials, silvery-white; leaflets oblanceolate to obovate or elliptic, 5 to 12 mm. long; corolla purple or ochroleucous.

Raceme 1 to 3-flowered; calyx teeth lance-subulate; corolla 12 mm. long; pod oblong, slightly curved, 15 to 20 mm. long, strigillose. 41. A. calycosus.

Raceme several-flowered; calyx teeth triangular-lanceolate; corolla 10 mm. long; pod oblong, curved, 12 mm. long, strigillose----42. A. scaposus.

Plants with leafy stems.

Plant glabrous or strigose. Annual with ascending or decumbent branches; leaflets about 11, oblong, 4 to 10 mm. long; calyx 3 to 4 mm. long, black or white-hairy; corolla purplish; pod linear, curved, 2 cm. long. 46. A. nuttallianus trichocarpus.

Plants villous or hirsute, 10 to 60 cm. high.

Leaflets 15 to 25, oval or oblong, mucronate, 6 to 10 mm. long. Calyx campanulate, 6 mm. long, the teeth equaling the tube; corolla ochroleucous; pod linear-oblong, incurved, sessile, 15 to 20 mm. long. 43. A. andersonii.

Leaflets 13 to 17, obovate, retuse or rounded.

Calyx 13 mm. long, white-villous; corolla deep purple; pod oblong-lanceolate, incurved, sessile, 25 mm. long----------44. A. malacus.

Calyx 9 mm. long, black-hairy; corolla whitish, tipped with purple; pod oblong, incurved, obcompressed, 4 cm. long--------45. A. layneae.

5. Tium. Pods 1-celled, chartaceous or coriaceous, the lower suture strongly intruded.

Calyx 3 to 5 mm. long, black-hairy, the teeth shorter than the tube. Corolla yellowish or purplish; pods linear, straight, about 2 cm. long.

Calyx 3 to 4 mm. long; stems 30 to 60 cm. high, glabrous or nearly so; leaflets 17 to 27, oblong, obtuse, or truncate, 5 to 15 mm. long--54. A. rusbyi.

Calyx 4 to 5 mm. long; stems 20 to 30 cm. high, strigose; leaflets 11 to 15, oblong or oval, sparingly strigose, 5 to 10 mm. long----50. A. obscurus.

Calyx 5 to 9 mm. long or more, black or white-hairy.

Calyx teeth longer than the tube. Stems procumbent, 20 to 50 cm. long; leaflets 13 to 17, linear-oblong or oblanceolate, 7 to 15 mm. long; peduncles elongated; corolla violet or purplish; pod 15 to 18 mm. long, linear-oblong, curved, pubescent----------55. A. humistratus.

Calyx teeth two-thirds as long as the tube of the shorter.
Calyx 9 mm. long, the teeth as long as the tube. Corolla ochroleucous; pod linear, curved, long-stipitate, glabrous, the body 25 to 30 mm. long; leaflets 15 to 27, oblong or oval, glabrous above.
53. A. scopulorum.
Calyx 6 to 8 mm. long.
Plant low, more or less cespitose, strigose. Leaflets lanceolate to oval; flowers purple or ochroleucous, in long-pedunculate racemes; pod sessile, curved, reflexed, 12 mm. long, villous--**56. A. desperatus.**
Plants with elongate leafy stems 20 cm. long or more.
Plant villous. Leaflets 25 to 31, linear-oblong to elliptic, glabrous or nearly so above; pod long-stipitate, reflexed, glabrous, linear, 25 to 30 mm. long----------**52. A. drummondii.**
Plants strigose to glabrate. Peduncles elongate.
Plant glabrous or nearly so. Leaflets 13 to 19 or more, oblong to obovate; peduncles elongate; pod long-stipitate, the body oblong, 15 to 20 mm. long, erect, glabrous--------**49. A. eremiticus.**
Plants strigose, 30 to 70 cm. high.
Leaflets 4 to 7 pairs, linear to narrowly elliptic, shorter than the internodes.
Corolla about 12 mm. long, ochroleucous, tinged with violet; pod 20 mm. long----------**47. A. atratus.**
Corolla 7 mm. long, ochroleucous or purplish; pod 12 to 16 mm. long----------**48. A. straturensis.**
Leaflets approximate, commonly longer than the internodes, linear to oblanceolate, often glabrate above. Corolla ochroleucous; pod short-stipitate, the body oblong, 15 to 20 mm. long, erect, pubescent----------**51. A. arrectus.**

6. Diholcos

Pod 1-celled, 2-grooved on the upper side, stipitate. A single species.
57. A. haydenianus.

7. Jonesiella

Pods 1-celled, coriaceous, stipitate; leaves simple. A single species.
58. A. asclepiadoides.

8. Rydbergiella. Pods 1-celled, coriaceous, stipitate, the sutures not intruded.

Corolla ochroleucous, 16 to 20 mm. long. Leaflets 11 to 21, oblong to oval, 10 to 35 mm. long.
Plants glabrous; calyx strigillose, about 7 mm. long, the teeth half as long as the tube or shorter; pod ovoid, abruptly acute, 2 to 3 cm. long, glabrous----------**59. A. sabulosus.**
Plants more or less hispidulous; calyx strigose, 9 mm. long or more, the teeth subulate, half as long as the tube; pod ovoid, acuminate, 20 to 25 mm. long, glabrous----------**60. A. pattersonii.**
Corolla purple or purplish. Calyx 9 to 10 mm. long, black-hairy.
Leaflets 13 to 17, obovate or rounded, retuse, glabrous, 1 to 2 cm. long; corolla purple, 20 to 25 mm. long; pod oblong, acute, the body about 25 mm. long, the stipe 4 mm----------**61. A. preussii.**
Leaflets oblanceolate, glabrous or nearly so, 4 to 10 mm. long; corolla purplish, about 18 mm. long; pod elliptic-oblong, the body 20 to 25 mm. long, the stipe 5 to 8 mm----------**62. A. arctus.**

9. Ctenophyllum. Pods 1-celled, sessile, the epicarp fleshy, cross-ribbed; plants rushlike.

Leaflets linear-oblong, 3 to 4 cm. long. Pod about 3 cm. long, acuminate. **64. A. canonis.**

Leaflets linear, rarely over 2 cm. long.

Calyx 12 mm. long, black-hairy. Corolla purple; leaflets 5 to 10 mm. long. **65. A. serenoi.**

Calyx 10 mm. long or less. Pods about 2 cm. long, acute.

Pods about 5 mm. broad—**63. A. toanus.**

Pods about 7 mm. broad—**66. A. shockleyi.**

10. Cnemidophacos. Pods 1-celled, sessile, woody; stipules united.

Corolla purple, 10 mm. long; calyx silky-pilose, the teeth equaling the tube.

Pod sessile, ovate or oval, white-hairy, about 10 mm. long; plants 10 to 20 cm. high, white-strigose, cespitose; leaflets 9 to 13, linear, 10 to 20 mm. long—**67. A. argillosus.**

Corolla pale yellow or pale lilac, 10 to 12 mm. long, the keel purple-tipped; calyx strigose, the teeth half as long as the tube. Plants 10 to 30 cm. high, strigose-canescent; leaflets 5 to 13, narrowly linear.

Corolla pale yellow; pod ovoid, 12 to 15 mm. long; raceme dense. **68. A. flavus.**

Corolla pale lilac; pod oval-oblong, about 12 mm. long; raceme 5 to 8 cm. long—**69. A. confertiflorus.**

11. Xylophacos. Pods 1-celled, woody.

Calyx 20 mm. long, reddish. Corolla red, 3 to 3.5 cm. long; pod oblong, curved, tomentose, 5 cm. long; leaflets numerous, oblong or elliptic. **77. A. coccineus.**

Calyx 18 mm. long or less.

Leaflets 5 to 15, linear, distant. Calyx 7 mm. long, black-hairy, the teeth short; corolla purple; pod straight or slightly curved, mottled, strigose; plant sparingly strigose, 30 to 40 cm. high—**72. A. casei.**

Leaflets oblong to obovate or rounded.

Plants sparingly pubescent or strigose to nearly glabrous, the stems usually decumbent and leafy. Calyx black-hairy or with black and white hairs intermixed; pods curved.

Leaflets oblong or ovate, acute, 10 to 15 mm. long; corolla light purple.

Pod 3 cm. long, mottled, sulcate; racemes long-pedunculate. **76. A. zionis.**

Leaflets usually obovate, obtuse or retuse, 8 to 15 mm. long, glabrate above; corolla purple or ochroleucous.

Pod mottled, strongly curved; flowers ochroleucous or purple; calyx 6 to 7 mm. long—**70. A. iodanthus.**

Pod not mottled, slightly curved; flowers always purple or tipped with purple; calyx 8 mm. long or more—**71. A. cibarius.**

Plants decidedly grayish or whitish-strigose, villous, or tomentose, mostly low and cespitose.

Leaflets 1 to 7, lanceolate or lance-elliptic, 2.5 cm. long or less. Calyx black-hairy; corolla 2 cm. long; pod ovate, 2 to 2.5 cm. long, curved, hirsute—**83. A. musiniensis.**

Leaflets 5 or more, orbicular to lanceolate.
Calyx 16 to 20 mm. long, villous-hirsute with black hairs. Corolla nearly 3 cm. long; pod 25 mm. long, villous-hirsute, curved; plant nearly acaulescent; leaflets 11 or more, obovate, grayish-pubescent. **86. A. watsonianus.**
Calyx 18 mm. long or less. Corolla ochroleucous or purple.
Calyx about 8 mm. long, black-hairy. Pod ovate-oblong, 16 mm. long, straight; stems matted, 15 cm. long; leaflets 9 to 11, elliptic, obtuse, about 6 mm. long, appressed-pubescent. **81. A. cymboides.**

Calyx 9.5 to 18 mm. long.
Calyx teeth 2.5 mm. long or less.
Corolla 15 mm. long; leaflets 7 to 11, broadly obovate to oval, obtuse, 7 mm. long or less. Pod ovoid, 2 to 3 cm. long, falcate, mottled; plant nearly stemless__**82. A. chamaeleuce.**
Corolla 20 to 30 mm. long; leaflets 11 to 25, 5 to 12 mm. long.
Calyx without black hairs. Pubescence appressed; leaflets lance-oblong; pod ovoid, 20 to 25 mm. long, obcompressed, strigose_____**79. A. uintensis.**
Calyx strigose with black hairs or with black and white hairs intermixed.
Leaflets obovate, obtuse. Pod mostly straight, oblong, 3 to 5 cm. long_____**80. A. vespertinus.**
Leaflets elliptic to lanceolate, obtuse or acute.
Racemes exceeding the leaves; calyx about 10 mm. long; pods crescent-shaped, 2 to 5 cm. long, strigose. **73. A. amphioxys.**
Racemes equaling or shorter than the leaves; calyx about 12 mm. long; pods ovoid, 20 mm. long or more, villous. **88. A. glareosus.**

Calyx teeth 3 to 5 mm. long.
Leaflets acute.
Calyx black-hairy. Pod 3 to 5 cm. long, acuminate, long-hairy; leaflets elliptic to oval, 10 to 15 mm. long. **74. A. eurekensis.**
Calyx without black hairs.
Leaflets 15 to 17, lanceolate; corolla 15 to 20 mm. long; pod ovoid, 2 cm. long, slightly curved, strigose. **78. A. argophyllus.**
Leaflets 9 to 13, oblong or oblanceolate; corolla 20 to 25 mm. long, ochroleucous; pod ovoid, 2 to 2.5 cm. long, villous-hirsute, slightly curved_____**89. A. purshii.**
Leaflets obtuse (acutish in no. 89a).
Calyx 10 mm. long; corolla purple, 16 mm. long; pod ovate, 12 to 20 mm. long, sessile, glabrous, compressed. Leaflets 12 to 15 pairs, oval, glabrous above or nearly so. **75. A. remulcus.**
Calyx 13 to 16 mm. long; corolla 20 to 30 mm. long; pods densely woolly or hirsute.
Corolla violet or purple.
Corolla 20 to 25 mm. long; pod ovoid, curved, 2 cm. long, woolly-hirsute; leaflets obovate to oblong, villous_____**89a. A. purshii tinctus.**

Corolla 25 to 28 mm. long; pod ovoid, 2 cm. long, wolly-tomentose; leaflets orbicular to obovate, densely white-tomentose_____87. **A. utahensis.**
Corolla ochroleucous. Leaflets obovate, densely appressed woolly-pubescent.
Peduncles very short; leaflets obtuse, 10 mm. long. **84. A. newberryi.**
Peduncles equaling the leaves; leaflets often retuse, 10 to 14 mm. long_____85. **A. candelarius.**

12. Pterophacos. Pods 1-celled, coriaceous, sessile, winged.

Leaflets 20 to 30 mm. long, strigose; corolla purple, 10 to 15 mm. long; pod flattened, 4 cm. long, straight, winged_____90. **A. pterocarpus.**
Leaflets 10 to 20 mm. long, glabrous or nearly so; corolla white, about 15 mm. long; pod 3 to 4 cm. long, curved, the valves winged____91. **A. tetrapterus.**

13. Atelophragma. Pods 1-celled, membranous, stipitate, flattened.

Leaflets 1 to 7, linear to elliptic, 4 to 12 mm. long. Calyx short-campanulate, the teeth 1 mm. long; corolla white, 6 mm. long; pod linear-oblong, 12 mm. long, strigose, stipitate_____92. **A. ibapensis.**
Leaflets 9 to 17.
Calyx white-hairy, 2 to 3 mm. long. Stems numerous, ascending.
Calyx teeth half as long as the tube; corolla 5 mm. long. Pod sessile, oblong, 10 to 15 mm. long, strigose; leaflets linear, distant, 5 to 15 mm. long_____94. **A. brandegei.**
Calyx teeth equaling the tube; corolla 4 to 6 mm. long.
Plants appressed-pubescent, the stems 30 to 60 cm. long; leaflets 9 or 11, linear-oblong, mucronate; pod ovate-oblong, sulcate, obtuse, 4 mm. long, puberulent_____95. **A. lemmoni.**
Plants villous-pubescent, the stems 30 cm. long or less; leaflets 11 to 15, obovate to oblong-spatulate, retuse or rounded; pod broadly oblong, 6 mm. long, puberulent_____96. **A. lentiformis.**
Calyx black-hairy.
Calyx 3 to 4 mm. long, the teeth half as long as the tube; corolla 6 to 8 mm. long. Pod black-hairy, lance-oblong, about 15 mm. long, compressed; plants strigose or glabrate, with erect or decumbent stems 25 to 60 cm. high; leaflets 11 or more, oblong to elliptic. **97. A. occidentalis.**
Calyx 5 to 8 mm. long; corolla 8 to 15 mm. long.
Stems very numerous, strigose, 10 to 15 cm. high; leaflets linear, 4 to 6 mm. long; calyx teeth equaling the tube; corolla ochroleucous; pod linear, 12 mm. long, short-stipitate, mottled. **98. A. panamintensis.**
Stems solitary or few; leaflets 9 to 15, linear-oblong to elliptic, 10 to 20 mm. long; calyx teeth two-thirds as long as the tube; pod oblanceolate, 15 to 20 mm. long, glabrous, the lower suture nearly straight_____93. **A. aboriginum.**

14. Homalobus. Pods 1-celled, membranous, sessile or stipitate.

Leaves simple or rarely 3-folliolate. Corolla purple; pod sessile.
Calyx teeth equaling the tube; pod lance-oblong, about 10 mm. long, acute, strigose; leaves linear-oblanceolate_____99. **A. spatulatus.**

Calyx teeth half as long as the tube; pod ovate-lanceolate, about 7 mm. long, sparingly strigose, abruptly acute; leaflets oblanceolate.
100. A. simplex.

Leaves pinnate.
Calyx 8 mm. long or more. Tall erect plants; corolla ochroleucous.
Calyx with black hairs, the teeth blunt. Pod strigose, coiled; leaflets numerous, distant, oblong or obovate, emarginate, strigose.
116. A. speirocarpus.
Calyx without black hairs.
Leaflets 1 to 5, linear or filiform, 1 to 3 cm. long; pod long-stipitate, lanceolate, 3 to 4 cm. long, straight, flattened, rugose.
118. A. lonchocarpus.
Leaflets oblong to obovate, rounded or retuse, 2 cm. long or less; pods long-stipitate, curved.
Calyx teeth broadly triangular, 1 to 1.5 mm. long; pod glabrous, curved; plant cinereous-pubescent----------115. A. curvicarpus.
Calyx teeth triangular-lanceolate, 2 to 3 mm. long; pod pubescent, mottled, falcate or curved; plant soft-pubescent----117. A. gibbsii.
Calyx small, rarely 7 mm. long.
Calyx 5 to 7 mm. long
Plants low, matted, ashy-strigose. Leaflets mostly 5, linear-oblanceolate; calyx white-hairy; corolla purple; pod 25 mm. long, mottled, curved.
101. A. detritalis.
Plants erect, 30 cm. high or more.
Leaflets 1 to 11, narrowly linear; calyx black-hairy, the teeth very short; corolla reddish purple; pod linear-oblanceolate, 3 cm. long (including the stipe)----------112. A. coltoni.
Leaflets 5 to 11, broadly obovate; calyx white or black-hairy, the teeth fully 2 mm. long; corolla ochroleucous; pod oblong, somewhat curved, 2 cm. long (including the stipe). Plant glabrous.
114. A. porrectus.
Calyx 2 to 4 mm. long, rarely longer (4 to 5 mm. in Nos. 103 and 109).
Leaflets 1 to 7 (rarely 9), linear to linear-subulate, often wanting. Corolla white, often tinged with purple.
Leaflets 5 to 10 mm. long. Calyx black-hairy; corolla white or purplish; pod strigose, straight, 12 to 15 mm. long; plant low.
108. A. garrettii.
Leaflets 10 to 30 mm. long. Plants 30 to 60 cm. high, rushlike; corolla ochroleucous, tipped with purple.
Stems glabrous, flexuous; pod oblong, 25 to 30 mm. long, glabrous.
111. A. episcopus.
Stems cinereous-puberulent; pod strigose, 20 to 30 mm. long.
107. A. diversifolius.
Leaflets 9 to 21.
Stems glabrous, 40 to 70 cm. high.
Corolla white, tipped with purple; pod 25 to 30 mm. long, glabrous, sessile or short-stipitate----------111. A. episcopus.
Corolla ochroleucous; pod oblong, 30 to 40 mm. long (including the slender stipe). Leaflets linear or oblong_110. A. stenophyllus.
Stems strigose or pubescent. Calyx mostly black-hairy.
Calyx teeth equaling the tube or nearly so. Corolla purple.
Leaflets oblong, 3 to 8 mm. long, strigose; pod sessile, clavate, 15 mm. long, black-hairy----------109. A. carltonii.

Leaflets oblong to obovate, strigose beneath, glabrous above, 5 to 12 mm. long; pod sessile, oval, acute, 10 mm. long, black-hairy----------104. A. debilis.

Calyx teeth two-thirds as long as the tube or shorter.

Calyx white-hairy, the teeth one-third as long as the tube. Corolla purple or white tinged with purple; pod sessile, linear, 1.5 to 2 cm. long, strigose, straight or nearly so; stems flexuous; leaflets cuneate-elliptic, rounded or retuse. 113. A. flexuosus.

Calyx black-hairy.

Calyx barely over 2.5 mm. long. Corolla purplish; pod sessile or short-stipitate, oblong, 10 mm. long; leaflets 7 to 13, linear to elliptic, 5 to 15 mm. long, glabrous above. 102. A. wingatanus.

Calyx 3 to 4 mm. long.

Calyx 3 mm. long; corolla ochroleucous, 7 to 10 mm. long. Pod stipitate, oblong, 7 to 12 mm. long, glabrous or strigose; leaflets linear to oblong, glabrous above. 103. A. tenellus.

Calyx 4 mm. long; corolla white or ochroleucous, tinged with purple.

Leaflets linear to subulate; pod linear to oblong, pubescent----------105. A. convallarius.

Leaflets lance-oblong to elliptic, glabrate; pod linear-oblong, glabrous----------106. A. hylophilus.

15. Kentrophyta. Pods 1-celled, sessile; leaflets spinulose.

Stipules united near base, the free portion about 5 mm. long; corolla ochroleucous, tipped with purple; stems numerous, trailing or ascending, 30 to 40 cm. long----------119. A. impensus.

Stipules united for half their length, the free portion about 2 mm. long; corolla ochroleucous or purple; stems intricately branched, forming mats. 120. A. tegetarius.

1. **Astragalus ampullarius** S. Wats. Amer. Nat. 7: 300. 1873.
Wet places of the artemisia belt. Southern Utah.

2. **Astragalus wetherillii** Jones, Zoe 4: 34. 1893.
Plains and hillsides of the artemisia belt; Grand Junction, Colorado.

3. **Astragalus allochrous** A. Gray, Proc. Amer. Acad. 13: 366. 1878.
Plains and mountain sides of the Covillea belt, upward to the yellow pine belt. Colorado and Utah, southward to western Texas and Mexico.

4. **Astragalus eastwoodae** Jones, Zoe 4: 368. 1894.
Valleys of the artemisia belt. Colorado and Utah.

5. **Astragalus lutosus** Jones, Contr. West. Bot. 13: 7. 1910.
Barren soil of the artemisia belt. Western Colorado and Utah.

6. **Astragalus tejonensis** Jones, Proc. Calif. Acad. II. 5: 644. 1895.
Canyons and hillsides of the Covillea and lower artemisia belts. Southern California and southern Nevada.

7. **Astragalus ceramicus** Sheld. Minn. Bot. Stud. 9: 19. 1894.
Plains and rocky canyons of the artemisia belt. South Dakota to Idaho, southward to New Mexico and Arizona.

8. Astragalus geyeri A. Gray, Proc. Amer. Acad. **6**: 214. 1864.

Desert area and dry hillsides of the artemisia belt. Wyoming to Oregon, California, and Nevada.

Astragalus triquetrus A. Gray, Proc. Amer. Acad. **13**: 367. 1878.

Leaflets oblong; pods partly 2-celled, the dorsal suture intruded. Canyons; southeastern Nevada.

9. Astragalus artipes A. Gray, Proc. Amer. Acad. **13**: 370. 1878.

Yellow pine and aspen belts. Southern Utah, Arizona, and Nevada.

10. Astragalus oophorus S. Wats in King, Geol. Expl. 40th Par. **5**: 73. 1871.

Valleys and gravelly hillsides of the artemisia and pinyon belts. Utah to California and Oregon.

11. Astragalus whitneyi A. Gray, Proc. Amer. Acad. **6**: 526. 1865.

Aspen and spruce belts; Sierra Nevada. California and western Nevada.

12. Astragalus hookerianus (Torr. & Gray) A. Gray, Proc. Amer. Acad. **6**: 215. 1864.

Phaca hookeriana Torr. & Gray, Fl. N. Amer. **1**: 693. 1840.

Plains, hillsides, and stony plateaus, upward to the yellow pine belt. Washington to Nevada and California.

13. Astragalus megacarpus (Nutt.) A. Gray, Proc. Amer. Acad. **6**: 215. 1864.

Phaca megacarpa Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 343. 1838.

Astragalus megacarpus prodigus Sheld. Minn. Bot. Stud. **9**: 136. 1894.

Plains and sandy draws of the artemisia belt. Utah and Wyoming.

14. Astragalus wardii A. Gray, Proc. Amer. Acad. **12**: 55. 1876.

Aspen and spruce belts. Utah.

15. Astragalus hornii A. Gray, Proc. Amer. Acad. **7**: 398. 1868.

Valleys of the Covillea and lower artemisia belts. California to southern Utah.

16. Astragalus subcinereus A. Gray, Proc. Amer. **13**: 366. 1878.

Covillea and artemisia belts. Southern Utah and Arizona.

17. Astragalus serpens Jones, Proc. Calif. Acad. II. **5**: 641. 1895.

Sagebrush areas, at 2,000 to 2,300 meters. Utah.

18. Astragalus sileranus Jones, Zoe **2**: 242. 1891.

Yellow pine, aspen, and spruce belts. Utah.

19. Astragalus jejunus S. Wats. in King, Geol. Expl. 40th Par. **5**: 73. *pl. 13, f. 1–6.* 1871.

Foothills of the pinyon belt. Wyoming and Utah.

20. Astragalus beckwithii Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **2**: 120. *pl. 3.* 1855.

Artemisia, pinyon, and yellow pine belts. Idaho, Utah, and Nevada.

21. Astragalus artemisiarum Jones, Zoe **4**: 369. 1894.

Astragalus beckwithii purpureus Jones, Zoe **3**: 288. 1893.

Hillsides of the artemisia and pinyon belts. Western Utah and Nevada.

22. Astragalus pubentissimus Torr. & Gray, Fl. N. Amer. **1**: 693. 1840.

? Astragalus peabodianus Jones, Zoe **3**: 295. 1893.

Canyons and mountain sides of the artemisia and pinyon belts. Wyoming, Colorado, and Utah.

23. Astragalus sabulonum A. Gray, Proc. Amer. Acad. **13**: 368. 1878.
Astragalus virgineus Sheld.; Coville, Contr. U. S. Nat. Herb. **4**: 88. 1893.
Valleys of the Covillea belt. Southern Nevada.

24. Astragalus sesquiflorus S. Wats. Proc. Amer. Acad. **10**: 346. 1875.
Canyons and dry hillsides of the artemisia belt. Utah and Arizona.

25. Astragalus platytropis A. Gray, Proc. Amer. Acad. **6**: 526. 1865.
Aspen and spruce belts. California and Nevada.

26. Astragalus coulteri Benth. Pl. Hartw. 307. 1848.
Desert areas and hillsides of the Covillea belt. California, Arizona, southern Nevada, and Utah.

27. Astragalus fremontii A. Gray; Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 80. 1857.
Astragalus eremicus Sheld.; Coville, Contr. U. S. Nat. Herb. **4**: 86. 1893.
Desert areas and valleys of the Covillea and artemisia belts. Arizona and Nevada. Perhaps only a form of *A. lentiginosus*.

28. Astragalus diphysus A. Gray, Mem. Amer. Acad. n. ser. **4**: 34. 1849.
Plains and hillsides of the upper Covillea, artemisia, and pinyon belts. Colorado, Utah, New Mexico, and Nevada.

29. Astragalus araneosus Sheld. Minn. Bot. Stud. **9**: 170. 1894.
Astragalus latus Jones, Zoe **4**: 272. 1893.
Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Central and southern Utah to Nevada.

30. Astragalus lentiginosus Dougl.; Hook. Fl. Bor. Amer. **1**: 151. 1834.
Arid plains. Washington to Nevada and California.

31. Astragalus heliophilus (Rydb.) Tidestrom.
Cystium heliophilum Rydb. Fl. Rocky Mount. 491, 1063. 1917.
Hills and mountain sides of the pinyon and yellow pine belts. Montana, Wyoming, and Utah.

32. Astragalus bigelovii A. Gray, Pl. Wright. **2**: 42. 1853.
Plains and mountain sides of the Covillea, artemisia, and pinyon belts. Texas to Colorado, Arizona, and Mexico.

33. Astragalus thompsonae S. Wats. Proc. Amer. Acad. **10**: 345. 1875.
Plains and foothills of the artemisia and pinyon belts. Utah.

34. Astragalus carolinianus L. Sp. Pl. 757. 1753.
Astragalus canadensis L. Sp. Pl. 757. 1753.
Meadows and canyons of the artemisia, pinyon, and yellow pine belts. Quebec to Florida, Utah(?), and British Columbia.

35. Astragalus mortoni Nutt. Journ. Acad. Phila. **7**: 19. 1834.
Valleys of the artemisia and yellow pine belts. Montana to British Columbia, southward to Nevada and northern California.

36. Astragalus spicatus Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 336. 1838.
Valleys of the artemisia and pinyon belts. South Dakota to Idaho, southward to Wyoming and Nevada. Perhaps only a form of the preceding species.

37. Astragalus ursinus A. Gray, Proc. Amer. Acad. **13**: 367. 1878.
Valleys of the artemisia belt. Utah.

38. Astragalus palans Jones, Zoe **4**: 37. 1893.

Foothills and canyons of the artemisia and pinyon belts. Utah and Arizona.

39. Astragalus goniatus Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 330. 1838.

Plains, canyons, and mountain parks, upward to the spruce belt. Hudson Bay to New Mexico, Utah, Oregon, and British Columbia.

40. Astragalus accidens S. Wats. Proc. Amer. Acad. **22**: 471. 1887.

Open woods. Oregon and northern Nevada.

41. Astragalus calycosus Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 66. *pl. 10, f. 4–7.* 1871.

Canyons and mountain sides of the pinyon belt, upward to the spruce belt. Idaho and Utah, westward to California.

42. Astragalus scaposus A. Gray, Proc. Amer. Acad. **13**: 366. 1878.

Plains and hillsides of the artemisia and pinyon belts. Wyoming to New Mexico, Arizona, and Utah.

43. Astragalus andersonii A. Gray, Proc. Amer. Acad. **6**: 524. 1865.

Valleys, canyons, and foothills of the artemisia, pinyon, and yellow pine belts. Nevada and California.

44. Astragalus malacus A. Gray, Proc. Amer. Acad. **7**: 336. 1868.

Desert areas and dry hillsides of the Covillea and artemisia belts. Nevada and California to Idaho and Oregon.

45. Astragalus layneae Greene, Bull. Calif. Acad. **1**: 156. 1885.

Canyons and hillsides of the Covillea and artemisia belts. Southern Nevada and southern California.

46. Astragalus nuttallianus trichocarpus Torr. & Gray, Fl. N. Amer. **1**: 334. 1838.

Hamosa austrina Small, Fl. Southeast. U. S. 618, 1332. 1903.

Plains, rocky hillsides, and canyons of the Covillea and artemisia belts. Texas to Utah, California, and Mexico.

47. Astragalus atratus S. Wats. in King, Geol. Expl. 40th Par. **5**: 69. *pl. 11.* 1871.

Astragalus atratus stenophyllus Jones, Zoe **3**: 297. 1893.

Astragalus pinonis Jones, Contr. West. Bot. **8**: 14. 1898.

Astragalus atratus phyllophorus Jones, Contr. West. Bot. **10**: 62. 1902.

Plains and foothills of the artemisia and pinyon belts. Nevada and California.

48. Astragalus straturensis Jones, Contr. West. Bot. **8**: 19. 1898.

Hamosa atratiformis Rydb. Bull. Torrey Club **34**: 48. 1907.

Plains and hillsides of the artemisia and pinyon belts. Southern Utah.

49. Astragalus eremiticus Sheld. Minn. Bot. Stud. **9**: 161. 1894.

Astragalus arrectus scaphoides Jones, Proc. Calif. Acad. II. **5**: 664. 1895.

Pinyon belt. Utah, Arizona, and Nevada.

50. Astragalus obscurus S. Wats. in King, Geol. Expl. 40th Par. **5**: 69. 1871.

Desert areas, plains, and stony hillsides of the artemisia, pinyon, and yellow pine belts. Idaho, Oregon, Nevada, and California.

51. Astragalus arrectus A. Gray, Proc. Amer. Acad. **8**: 289. 1870.

Pinyon and yellow pine belts. Washington and Idaho to Nevada.

52. Astragalus drummondii Dougl.; Hook. Fl. Bor. Amer. **1**: 153. *pl. 57.* 1834.

Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Saskatchewan and Alberta, southward to Nebraska and Utah.

53. Astragalus scopulorum Porter in Port. & Coult. Syn. Fl. Colo. 24. 1874.

Pinyon, yellow pine, aspen, and spruce belts. Colorado, New Mexico, and Utah.

54. Astragalus rusbyi Greene, Bull. Calif. Acad. 1: 8. 1884.

Pinyon and yellow pine belts. Utah and Arizona to New Mexico and Mexico.

55. Astragalus humistratus A. Gray, Pl. Wright. 2: 43. 1853.

Astragalus humistratus tenerrimus Jones, Proc. Calif. Acad. II. 5: 649. 1895.

Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. New Mexico and southern Colorado to southern California.

56. Astragalus desperatus Jones, Zoe 2: 243. 1891.

Artemisia belt. Colorado and Utah.

57. Astragalus haydenianus A. Gray in T. S. Brandeg. Bull. U. S. Geol. Geogr. Surv. Terr. 2: 235. 1876.

Astragalus haydenianus nevadensis Jones, Zoe 2: 241. 1891.

Astragalus scobinatulus Sheld. Minn. Bot. Stud. 9: 19. 1894.

Valleys, canyons, and mountain sides of the artemisia, pinyon, and yellow pine belts. Wyoming and Colorado, westward to Nevada.

58. Astragalus asclepiadoides Jones, Zoe 2: 238. 1891.

Jonesiella asclepiadoides Rydb. Bull. Torrey Club 32: 661. 1906.

Plains and foothills of the artemisia and pinyon belts. Colorado and Utah.

59. Astragalus sabulosus Jones, Zoe 2: 239. 1891.

Astragalus procerus A. Gray, Proc. Amer. Acad. 13: 369. 1878. Not *A. procerus* Boiss. & Hausskn. 1872.

Astragalus praelongus Sheld. Minn. Bot. Stud. 9: 23. 1894.

Valleys, plains, and hillsides of the Covillea and artemisia belts. Colorado and New Mexico, westward to California.

60. Astragalus pattersonii A. Gray; T. S. Brandeg. Bull. U. S. Geol. Geogr. Surv. Terr. 2: 285. 1876.

Plains and foothills of the artemisia, pinyon, and yellow pine belts. Colorado and Utah.

61. Astragalus preussii A. Gray, Proc. Amer. Acad. 6: 222. 1864.

Astragalus preussii laxiflorus A. Gray, Proc. Amer. Acad. 13: 369. 1878.

?*Astragalus mokiacensis* A. Gray, Proc. Amer. Acad. 13: 367. 1878.

Plains and hillsides of the Covillea and artemisia belts. Utah and Arizona to southern California.

62. Astragalus arctus (Sheld.) Tidestrom.

Astragalus preussii latus Jones, Zoe 4: 36. 1893.

Astragalus preussii arctus Sheld. Minn. Bot. Stud. 9: 130. 1894.

Plains and hillsides of the artemisia belt. Utah.

63. Astragalus toanus Jones, Zoe 3: 296. 1893.

Artemisia belt. Nevada and Utah.

64. Astragalus canonis Jones, Contr. West. Bot. 8: 15. 1898.

Artemisia belt. Nevada.

65. Astragalus serenoi Sheld. Minn. Bot. Stud. 9: 130. 1894.

Astragalus nudus S. Wats. in King, Geol. Expl. 40th Par. 5: 74. 1871. Not *A. nudus* Clos. 1846.

Artemisia belt. Nevada.

66. **Astragalus shockleyi** Jones, Proc. Calif. Acad. II. 5: 659. 1895.
Astragalus campylophyllus Greene, Pittonia 3: 195. 1897.
Valleys and hillsides of the artemisia belt. Nevada.

67. **Astragalus argillosus** Jones, Zoe 2: 241. 1891.
Plains and dry hillsides of the artemisia belt. Utah.

68. **Astragalus flavus** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 335. 1838.
Plains and dry hillsides of the artemisia belt. Wyoming to New Mexico and Utah.

69. **Astragalus confertiflorus** A. Gray, Proc. Amer. Acad. 13: 368. 1878.
Plains and dry hillsides of the Covillea and artemisia belts. Utah. Perhaps only a form of *A. flavus* (see Jones, Zoe 2: 242. 1891).

70. **Astragalus iodanthus** S. Wats. in King, Geol. Expl. 40th Par. 5: 70. 1871.
Foothills of the pinyon and yellow pine belts. Nevada and California.

71. **Astragalus cibarius** Sheld. Minn. Bot. Stud. 9: 149. 1894.
Astragalus arietinus Jones, Proc. Calif. Acad. II. 5: 653. 1895.
Benches and foothills of the pinyon belt. Montana to Colorado and Utah.

72. **Astragalus casei** A. Gray in S. Wats. Bot. Calif. 1: 154. 1876.
Artemisia plains. California and western Nevada.

73. **Astragalus amphioxys** A. Gray, Proc. Amer. Acad. 13: 366. 1878.
Xylophacos aragalloides Rydb. Bull. Torrey Club 34: 48. 1907.
Plains and dry hillsides of the Covillea and artemisia belts. Southern Colorado to Nevada, southward to Texas and Arizona.

74. **Astragalus eurekensis** Jones, Contr. West. Bot. 8: 12. 1898.
Valleys and foothills of the artemisia belt. Utah.

75. **Astragalus remulcus** Jones, Proc. Calif. Acad. II. 5: 658. 1895.
Yellow pine areas; northern Arizona.

76. **Astragalus zionis** Jones, Proc. Calif. Acad. II. 5: 652. 1895.
Hillsides of the artemisia and pinyon belts. Utah.

77. **Astragalus coccineus** T. S. Brandeg. Zoe 2: 72. 1891.
Astragalus grandiflorus S. Wats. Proc. Amer. Acad. 17: 370. 1882. Not *A. grandiflorus* Pall. 1800.
Canyons, mountain sides, and summits of the artemisia, pinyon, and yellow pine belts. Southern California and adjacent Nevada.

78. **Astragalus argophyllus** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 331. 1838.
Pinyon and yellow pine belts. Montana to Utah and Nevada.

79. **Astragalus uintensis** Jones, Proc. Calif. Acad. II. 5: 670. 1895.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Colorado, Arizona, and Nevada.

80. **Astragalus vespertinus** Sheld. Minn. Bot. Stud. 9: 150. 1894.
Desert areas and dry hillsides of the artemisia and pinyon belts. Colorado and eastern Utah.

81. **Astragalus cymboides** Jones, Proc. Calif. Acad. II. 5: 650. 1895.
Plains and hillsides of the artemisia and pinyon belts. Utah.

82. **Astragalus chamaeleuce** A. Gray in Ives, Rep. Colo. Riv. 10. 1861.
Phaca pygmaea Nutt.; Torr. & Gray, Fl. N. Amer. 1: 349. 1838. Not *Astragalus pygmaeus* Pallas, 1800.
Astragalus cicadae Jones, Zoe 4: 35. 1893.

Astragalus cicadae laccoliticus Jones, Proc. Calif. Acad. II. 5: 672. 1895.

Canyons, benches, and hillsides of the artemisia and pinyon belts. Colorado, Wyoming, and Utah.

83. Astragalus musiniensis Jones, Proc. Calif. Acad. II. 5: 671. 1895.

Desert areas and slopes of the artemisia and pinyon belts. Utah.

84. Astragalus newberryi A. Gray, Proc. Amer. Acad. 12: 55. 1877.

Plains and dry hillsides of the artemisia and pinyon belts. Southwestern Colorado, southern Utah, New Mexico, and Arizona.

85. Astragalus candelarius Sheld. Minn. Bot. Stud. 9: 142. 1894.

Astragalus candelarius exiguus Sheld. Minn. Bot. Stud. 9: 143. 1894.

Astragalus consectus Sheld. Minn. Bot. Stud. 9: 143. 1894.

?*Astragalus newberryi castoreus* Jones, Proc. Calif. Acad. II. 5: 658. 1895.

Desert areas and dry hillsides. Southern Utah, southern Nevada, and California.

86. Astragalus watsonianus (Kuntze) Sheld. Minn. Bot. Stud. 9: 144. 1894.

Astragalus eriocarpus S. Wats. in King, Geol. Expl. 40th Par. 5: 71. 1871.

Not *A. eriocarpus* DC. 1802.

Tragacantha watsoniana Kuntze, Rev. Gen. Pl. 2: 942. 1891.

Slopes in the artemisia and pinyon belts. Nevada.

87. Astragalus utahensis Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. 2: 120. 1854.

Foothills, canyons, and mountain sides of the artemisia and pinyon belts. Montana to Utah and Nevada.

88. Astragalus glareosus Dougl.; Hook. Fl. Bor. Amer. 1: 52. 1834.

Astragalus booneanus A. Nels. Bot. Gaz. 53: 223. 1912, in part.

Plains and foothills, upward to the aspen belt. Montana to Utah, westward to Washington and Nevada.

89. Astragalus purshii Dougl.; Don, Hist. Dichl. Pl. 2: 271. 1832.

Astragalus purshii longilobus Jones, Zoe 4: 269. 1893.

Plains, foothills, and canyons of the artemisia, pinyon, and yellow pine belts. Montana to British Columbia, southward to Colorado and California.

89a. Astragalus purshii tinctus Jones, Zoe 4: 269. 1893.

?*Astragalus funereus* Jones, Contr. West. Bot. 12: 11. 1908.

Foothills and mountain sides of the artemisia, pinyon, and yellow pine belts. Washington to California and Nevada.

90. Astragalus pterocarpus S. Wats. in King, Geol. Expl. 40th Par. 5: 71. *pl. 12, f. 1–2.* 1871.

Alkaline plains and dry hillsides. Nevada.

91. Astragalus tetrapterus A. Gray, Proc. Amer. Acad. 13: 369. 1878.

Plains and dry hillsides of the artemisia and pinyon belts. Southern Utah and Nevada.

92. Astragalus ibapensis Jones, Zoe 3: 290. 1893.

Hillsides of the artemisia and pinyon belts. Western Utah.

93. Astragalus aboriginum Richards. Bot. App. Frankl. Journ. 746. 1823.

Yellow pine, aspen, and spruce belts. Saskatchewan to Alaska, southward to Colorado and Nevada.

94. Astragalus brandegei Porter in Port. & Coult. Syn. Fl. Colo. 24. 1874.

Pinyon and yellow pine belts. Colorado, eastern Utah, New Mexico, and Arizona.

95. Astragalus lemmoni A. Gray, Proc. Amer. Acad. **8**: 626. 1873.

Desert areas and dry hillsides. California and western Nevada.

96. Astragalus lentiformis A. Gray in S. Wats. Bot. Calif. **1**: 156. 1876.

Desert areas and dry hillsides. Northeastern California, northern Nevada, and Oregon.

97. Astragalus occidentalis (S. Wats.) Jones, Contr. West. Bot. **8**: 17. 1898.

Astragalus robbinsii occidentalis S. Wats. in King, Geol. Expl. 40th Par. **5**: 70. 1871.

Spruce belt. Nevada.

98. Astragalus panamintensis Sheld.; Coville, Contr. U. S. Nat. Herb. **4**: 87. 1893.

Canyons and low hillsides of the upper Covillea belt. Southeastern California.

99. Astragalus spatulatus Sheld. Minn. Bot. Stud. **9**: 22. 1894.

Astragalus caespitosus A. Gray, Proc. Amer. Acad. **6**: 230. 1864. Not *A. caespitosus* Pall. 1790.

Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Saskatchewan to Nebraska, Colorado, and Utah.

100. Astragalus simplex Tidestrom, nom. nov.

Homalobus brachycarpus Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 352. 1838. Not *Astragalus brachycarpus* Bieb. 1809.

Plains and rocky hillsides of the artemisia and pinyon belts. Wyoming and northern Utah.

101. Astragalus detritalis Jones, Contr. West. Bot. **13**: 9. 1910.

Slopes of the artemisia belt. Utah.

102. Astragalus wingatanus S. Wats. Proc. Amer. Acad. **18**: 192. 1883.

? *Astragalus dodgianus* Jones, Zoe **3**: 289. 1892.

Canyons and dry foothills of the artemisia and pinyon belts. Colorado, Utah, New Mexico, and Arizona.

103. Astragalus tenellus Pursh, Fl. Amer. Sept. 473. 1814.

Orobus dispar Nutt. Gen. Pl. **2**: 95. 1818.

Homalobus strigulosus Rydb. Bull. Torrey Club **34**: 420. 1907.

Plains and mountain sides, upward to the spruce belt. Minnesota to British Columbia, southward to Kansas, New Mexico, and California.

104. Astragalus debilis (Nutt.) A. Gray. Proc. Acad. Phila. **1863**: 60. 1864.

Phaca debilis Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 345. 1838.

Meadows of the aspen and spruce belts. Mackenzie to Yukon, southward to Wyoming and Utah.

105. Astragalus convallarius Greene, Erythea **1**: 207. 1893.

Homalobus tenuifolius Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 352. 1838.

Astragalus campestris A. Gray, Proc. Amer. Acad. **6**: 230. 1866. Not *A. campestris* L. 1753.

Mountain sides, upward to the spruce belt. Wyoming, Colorado, and Utah.

106. Astragalus hylophilus (Rydb.) A. Nels. in Coulter, Man. Rocky Mount. 291. 1909.

Homalobus hylophilus Rydb. Mem. N. Y. Bot. Gard. **1**: 247. 1900.

Mountain sides of the yellow pine, aspen, and spruce belts. Montana, Wyoming, Utah, and Idaho.

107. Astragalus diversifolius A. Gray, Proc. Amer. Acad. **6**: 230. 1866.
Astragalus junciformis A. Nels. Bull. Torrey Club **26**: 9. 1899.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Montana and Idaho, southward to Arizona.

108. Astragalus garrettii Macbr. Contr. Gray Herb. n. ser. **65**: 36. 1922.
Homalobus paucijugus Rydb. Bull. Torrey Club **34**: 418. 1907. Not *A. paucijugus* Schrenk, 1844.
Spruce belt. Utah.

109. Astragalus carltonii Macbr. Contr. Gray Herb. n. ser. **65**: 36. 1922.
Homalobus humilis Rydb. Bull. Torrey Club **34**: 417. 1907. Not *Astragalus humilis* Bieb. 1808.
Slopes and ridges of the aspen and spruce belts. Utah.

110. Astragalus stenophyllus Torr. & Gray, Fl. N. Amer. **1**: 329. 1838.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Montana to British Columbia, southward to Nevada and California.

111. Astragalus episcopus S. Wats. Proc. Amer. Acad. **10**: 346. 1875.
Astragalus lancearius A. Gray, Proc. Amer. Acad. **13**: 370. 1878.
?Astragalus kaibensis Jones, Contr. West. Bot. **10**: 64. 1902.
Plains and hillsides of the artemisia belt. Utah, Arizona, and New Mexico.

112. Astragalus coltoni Jones, Zoe **2**: 237. 1891.
Astragalus coltoni moabensis Jones, Contr. West. Bot. **8**: 11. 1898.
Canyons and slopes of the artemisia and pinyon belts. Utah.

113. Astragalus flexuosus Dougl.; Hook. Fl. Bor. Amer. **1**: 141. 1830.
Plains and mountain sides, upward to the aspen belt. Saskatchewan and Alberta, southward to Kansas, New Mexico, and Utah.

114. Astragalus porrectus S. Wats. in King, Geol. Expl. 40th Par. **5**: 75. 1871.
Valleys and plains of the artemisia belt. Nevada.

115. Astragalus curvicarpus (Sheld.) Macbr. Contr. Gray Herb. n. ser. **65**: 38. 1922.
Astragalus speirocarpus curvicarpus Sheld. Minn. Bot. Stud. **9**: 125. 1894.
Plains and foothills of the artemisia belt. Washington to California and Nevada.

116. Astragalus speirocarpus A. Gray, Proc. Amer. Acad. **6**: 225. 1866.
Sagebrush plains and dry hillsides. Washington, Oregon, and Nevada.

117. Astragalus gibbsii Kellogg, Proc. Calif. Acad. **2**: 161. *f. 50.* 1863.
Astragalus cyrtoides A. Gray, Proc. Amer. Acad. **6**: 201. 1866.
Plains and foothills of the artemisia belt. Oregon, California, and Nevada.

118. Astragalus lonchocarpus Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 80. 1857.
Canyons and mountain sides of the artemisia, pinyon, and yellow pine belts. Colorado, Utah, and New Mexico.

119. Astragalus impensus (Sheld.) Woot. & Standl. Contr. U. S. Nat. Herb. **19**: 369. 1915.
Astragalus kentrophyta elatus S. Wats. in King, Geol. Expl. 40th Par. **5**: 77. 1871. Not *A. elatus* Boiss. & Bal. 1849.
Astragalus viridis impensus Sheld. Minn. Bot. Stud. **9**: 118. 1894.
? Astragalus kentrophyta ungulatus Jones, Proc. Calif. Acad. II. **5**: 650. 1895.
Valleys and canyons of the artemisia and pinyon belts. Nevada to Colorado and northern New Mexico.

120. Astragalus tegetarius S. Wats. in King, Geol. Expl. 40th Par. **5**: 76. *pl. 13, f. 7–10.* 1871.

Astragalus tegetarius rotundus Jones, Proc. Calif. Acad. II. **5**: 650. 1895.

Astragalus aculeatus A. Nels. Bull. Torrey Club **26**: 10. 1899.

Yellow pine, aspen, and spruce belts. Saskatchewan to Colorado, Nevada, and Idaho.

14. OXYTROPIS DC. Locoweed

Stipules free from the petiole; pods pendent, oblong, black-hairy. Plants 10 to 40 cm. high, loosely villous; leaflets lanceolate or ovate, numerous; corolla dull white ..... 1. O. deflexa.

Stipules adnate to the petiole; pods erect.

Leaflets verticillate, lance-oblong, silky. Plants 10 to 20 cm. high, densely villous; flowers dark blue, in a dense spike; pod ovoid, 12 to 15 mm. long, villous ..... 7. O. richardsonii.

Leaflets pinnately arranged.

Inflorescence 1 to 8-flowered, capitate. Plant low, pulvinate-cespitose, densely silky-strigose; leaflets lanceolate to oblong; corolla purple; pod ovate, 10 to 12 mm. long, villous ..... 2. O. oreophila.

Inflorescence many-flowered, spicate.

Plants more or less viscid, 5 to 20 cm. high, villous or villous-hirsute.

Calyx black-hairy; corolla dark bluish purple, with yellowish base; pod oblong-ovoid, 10 to 15 mm. long, black-hairy; leaflets 17 to 31, oblong ..... 5. O. viscidula.

Calyx white-hairy; corolla violet, rarely white; pod oblong-ovoid, 12 to 15 mm. long, pubescent; leaflets 31 or more, oblong-lanceolate. 6. O. viscida.

Plants not viscid.

Calyx about 9 mm. long, usually white-hairy; corolla dark bluish purple; pod lance-oblong; leaflets narrowly lanceolate. 3. O. lambertii.

Calyx 10 to 11 mm. long, black and white-hairy; corolla white, the keel purplish; pod oblong, abruptly acuminate; leaflets oblong to lanceolate ..... 4. O. albiflora.

1. Oxytropis deflexa (Pall.) DC. Astrag. 96. 1802.

Astragalus deflexus Pall. Act. Acad. Petrop. **3**[2]: 268. *pl. 15.* 1779.

Spruce and subalpine belts. Saskatchewan to Alaska, southward to New Mexico.

2. Oxytropis oreophila A. Gray, Proc. Amer. Acad. **20**: 3. 1885.

Spruce and subalpine belts. Utah and Idaho to California.

3. Oxytropis lambertii Pursh, Fl. Amer. Sept. 740. 1814.

Plains, hillsides, and canyons, upward to the aspen belt. Minnesota to Montana, southward to Texas and Arizona.

4. Oxytropis albiflora (A. Nels.) K. Schum. Just's Bot. Jahresb. **27**[1]: 496. 1901.

Aragallus albiflorus A. Nels. Erythea **7**: 62. 1899.

Aragallus majusculus Greene, Proc. Biol. Soc. Washington **18**: 12. 1905.

Pinyon, yellow pine, aspen, and spruce belts. Montana to Colorado and Utah.

5. Oxytropis viscidula (Rydb.) Tidestrom.

Aragallus viscidulus Rydb. Mem. N. Y. Bot. Gard. **1**: 253. 1900.

Spruce belt. Alberta to Yukon, southward to Colorado and Utah.

6. Oxytropis viscida Nutt.; Torr. & Gray, Fl. N. Amer. 1: 341. 1838.
Spruce belt. Montana and Wyoming to Nevada.

7. Oxytropis richardsonii (Hook.) Woot. & Standl. Contr. U. S. Nat. Herb. 19: 370. 1915.
Oxtropis splendens richardsonii Hook. Fl. Bor. Amer. 1: 148. 1834.
Spruce and subalpine belts. Saskatchewan to Yukon, southward to northern New Mexico.

15. GLYCYRRHIZA L. LICORICE

Pods prickly; native species ..... 1. G. lepidota.
Pods glandular; introduced species ..... 2. G. glabra.

1. Glycyrrhiza lepidota Nutt. Gen. Pl. 2: 106. 1818.
Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Ontario to Washington, California, and Mexico.

2. Glycyrrhiza glabra L. Sp. Pl. 742. 1753.
In cultivation; southern Nevada. Introduced from Europe.

16. HEDYSARUM L.

Leaflets strigose-canescent on both faces, oblong or elliptic. Calyx 8 mm. long, the teeth 5 mm. long; corolla reddish purple; loments strigose, the joints longer than broad ..... 1. H. cinerascens.
Leaflets glabrous or nearly so above.
Calyx about 8 mm. long, the teeth 5 mm. long; corolla rose-purple; loments puberulent, the joints broader than long; leaflets elliptic to oval or oblong. 2. H. utahense.
Calyx 5 to 6 mm. long, the teeth 3 to 4 mm. long; corolla purple; loments puberulent, suborbicular; leaflets oblong or elliptic ..... 3. H. pabulare.

1. Hedysarum cinerascens Rydb. Mem. N. Y. Bot. Gard. 1: 257. 1900.
Canyons and hillsides of the artemisia, pinyon, and yellow pine belts. Saskatchewan and Alberta, southward to Utah and Idaho.

2. Hedysarum utahense Rydb. Bull. Torrey Club 34: 424. 1907.
Canyons and mountain sides, upward to the spruce belt. Utah and Idaho.

3. Hedysarum pabulare A. Nels. Proc. Biol. Soc. Washington 15: 185. 1902.
Canyons and mountain sides, upward to the aspen belt. Montana to New Mexico and Utah.

17. ONOBRYCHIS Scop.

1. Onobrychis viciaefolia Scop. Fl. Carn. ed. 2. 2: 76. 1772. SAINFOIN.
Hedysarum onobrychis L. Sp. Pl. 751. 1753.
In cultivation and occasionally escaped; native of Europe. Montana to Colorado, Utah, and Idaho.

18. VICIA L. VETCH

Peduncles very short or none. Flowers few, purple or rose-colored; calyx teeth nearly equaling the tube.
Plants glabrous or nearly so; leaflets 5 to 11, oblong to linear; stipules narrow, few-toothed; flowers 10 to 18 mm. long; pod 4 to 5 cm. long, 5 to 7 mm. wide ..... 1. V. angustifolia.
Plants pubescent; leaflets 8 to 17, oblong to oblong-obovate, truncate or emarginate; stipules broad, sharp-toothed; flowers 20 mm. long or more; pod 4 to 8 cm. long, torulose, 7 to 8 mm. wide ..... 2. V. sativa.

Peduncles well developed.
Racemes 15 to 40-flowered. Pods oblong, 2 cm. long or more, 7 to 10 mm. wide; stipules narrow, entire; leaflets 16 to 24, oblong-lanceolate.
Flowers blue, turning purple, 10 to 12 mm. long; calyx teeth shorter than the tube; pubescent perennial_____8. V. cracca.
Flowers violet and white, 15 mm. long or more; calyx teeth slender, equaling the tube; villous annual or biennial_____9. V. villosa.
Racemes 1 to 10-flowered.
Flowers 6 to 12 mm. long, pale blue or whitish. Calyx teeth a little shorter than the tube; pod glabrous, 15 to 20 mm. long, 5 mm. wide; annual, more or less pubescent; leaflets 6 to 8, linear to oblong; stipules narrow, entire_____3. V. exigua.
Flowers 15 mm. long or more, purple.
Lower calyx teeth acuminate, 2 mm. long or more; leaflets 8 to 12, firm, glabrous, narrowly linear, acute, strongly veined; stipules narrow, entire, or with few teeth. Pod 3 cm. long, 6 to 7 mm. wide. 4. V. sparsifolia.
Lower calyx teeth acute or acuminate, 1.5 mm. long or less; leaflets 8 to 12, thin, linear-oblong to oval, acute, truncate, or emarginate; stipules broad, toothed.
Leaflets prominently veined, firm, narrowly oblong, mostly truncate, pubescent; pod 2 cm. long, puberulent or glabrate. 5. V. trifida.
Leaflets thin, not prominently veined; pod 2.5 to 3 cm. long, glabrous.
Plant glabrous or nearly so; leaflets elliptic-lanceolate to ovate-oblong; corolla about 20 mm. long_____6. V. americana.
Plant pubescent; leaflets elliptic-oblong, to linear below, cuspidate, serrate toward the apex, rarely emarginate; corolla about 15 mm. long_____7. V. oregona.

1. **Vicia angustifolia** Reich. Fl. Moen. Franc. 2: 44. 1778.
Waste places and meadows; Idaho. Introduced from Europe and established in many States.

2. **Vicia sativa** L. Sp. Pl. 736. 1753. COMMON VETCH
Waste ground; California. Introduced from Europe.

3. **Vicia exigua** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 272. 1838.
Hillsides and canyons of the Covillea belt, upward to 1,200 meters. Oregon to California, southern Utah, and New Mexico.

4. **Vicia sparsifolia** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 270. 1838.
Artemisia plains and mountain sides, upward to the spruce belt. Manitoba to Oklahoma, California, and British Columbia.

5. **Vicia trifida** Dietr. Syn. Pl. 4: 1112. 1847.
Plains and hillsides; Wyoming. Western Ontario to British Columbia, southward to Texas and California.

6. **Vicia americana** Muhl.; Willd. Sp. Pl. 3: 1096. 1801.
Meadows, canyons, and mountain sides of the artemisia belt, upward to 3,000 meters. New Brunswick to British Columbia, southward to Virginia and Arizona.

7. **Vicia oregona** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 270. 1838.
Meadows, canyons, and mountain sides of the artemisia belt, upward to 3,000 meters. Saskatchewan to New Mexico, westward to British Columbia and California.

8. Vicia cracca L. Sp. Pl. 735. 1753.

Waste places and fields; Oregon. Introduced from Europe. Newfoundland to British Columbia, southward to Virginia and California.

9. Vicia villosa Roth, Tent. Fl. Germ. 2²: 182. 1789.

In cultivation throughout the United States, and escaped. Colorado and New Mexico to California.

19. LATHYRUS L. Pea

Stipules large and broad, often half as long as the leaflets or longer.
  Corolla purple, 12 to 18 mm. long; pod 3 to 4 cm. long. Leaflets rhombic-oval or elliptic, 1 to 3 cm. long, thick and veiny——3. L. schaffneri.
  Corolla purple or white, about 20 mm. long; pod 4 to 6 cm. long.
    Leaflets oblanceolate to oblong——7. L. rigidus.
    Leaflets broadly oval, 2 to 5 cm. long——5. L. utahensis.
Stipules narrow and small, one-third as large as the leaflets or shorter.
  Plants climbing, the tendrils well developed. Corolla 18 mm. long or less, purple or white.
    Leaflets linear-lanceolate or oblong, coriaceous, 3 to 6 cm. long, mostly glabrous——2. L. coriaceus.
    Leaflets narrowly linear, membranous, 5 to 10 cm. long, glabrous. 4. L. graminifolius.

  Plants erect, the tendrils much reduced.
    Corolla 15 mm. long or less.
      Leaflets 2 to 4 pairs, elliptic, 1 to 3 cm. long. Corolla white. 8. L. leucanthus.

      Leaflets linear to linear-oblong, 3 to 8 cm. long.
        Leaflets mostly 2 pairs; corolla white——6. L. arizonicus.
        Leaflets 3 to 7 pairs; corolla purple or whitish——11. L. oregonensis.
    Corolla 20 mm. long or more.
      Leaflets linear to linear-oblong, 1 to 4 cm. long, villous or pubescent.
        Corolla purple or yellowish——1. L. incanus.
      Leaflets lance-oblong to elliptic or oblanceolate.
        Corolla purple, 25 to 30 mm. long; leaflets lance-oblong, coriaceous, veiny, glabrous or pubescent——10. L. eucosmus.
        Corolla white or yellowish; leaflets oblong or obovate, thin, glabrous or nearly so——9. L. nevadensis.

1. Lathyrus incanus (Smith & Rydb.) Rydb. Bull. Torrey Club **33**: 144. 1906.
Lathyrus ornatus incanus Smith & Rydb. Bot. Sem. Univ. Nebr. **21**: 64. 1895.
Plains and mountain sides, upward to the yellow pine belt. Nebraska to Utah.

2. Lathyrus coriaceus White, Bull. Torrey Club **21**: 452. 1894.
Lathyrus goldsteinae Eastw. Bull. Torrey Club **32**: 197. 1905.
Yellow pine, aspen, and spruce belts. Washington to Utah and California.

3. Lathyrus schaffneri Rydb. Mem. N. Y. Bot. Gard. **1**: 258. 1900.
Lathyrus parvifolius S. Wats. Proc. Amer. Acad. **17**: 345. 1882. Not *L. parvifolius* Roth. 1797.
Yellow pine belt. Southern Utah to California and Mexico.

4. Lathyrus graminifolius (S. Wats.) White, Bull. Torrey Club **21**: 454. 1894.
Lathyrus palustris graminifolius S. Wats. Proc. Amer. Acad. **23**: 263. 1888.
Yellow pine belt; Arizona. New Mexico to California, southward to Mexico.

5. **Lathyrus utahensis** Jones, Proc. Calif. Acad. II. 5: 678. 1895.
Canyons and mountain sides of the pinyon, yellow pine, and aspen belts. Colorado and Utah to Oregon.

6. **Lathyrus arizonicus** Britton, Trans. N. Y. Acad. 8: 65. 1889.
Yellow pine, aspen, and spruce belts. Colorado, New Mexico, and Arizona.

7. **Lathyrus rigidus** White, Bull. Torrey Club 21: 455. 1894.
Valleys and hillsides of the artemisia and yellow pine belts. Oregon and California.

8. **Lathyrus leucanthus** Rydb. Bull. Torrey Club 28: 37. 1901.
Aspen and spruce belts. Wyoming to New Mexico and Utah.

9. **Lathyrus nevadensis** S. Wats. Proc. Amer. Acad. 11: 133. 1876.
Yellow pine belt. Idaho and Washington to California.

10. **Lathyrus eucosmus** Butters & St. John, Rhodora 19: 160. 1917.
Yellow pine belt. Nebraska to Colorado and Arizona.

11. **Lathyrus oregonensis** White, Bull. Torrey Club 21: 456. 1894.
Yellow pine belt. Oregon, California, and western Nevada (?).

65. GERANIACEAE. Geranium Family

Annual or perennial herbs (our species); leaves alternate or opposite, often with stipules; flowers mostly perfect, regular, 5-merous, solitary or in clusters; stamens 5 or 10; styles united; ovary 1, 3 to 5-celled; carpels 1-seeded, separating at maturity.

Leaves palmately lobed or divided; styles glabrous within recoiled at maturity ..... 1. GERANIUM.
Leaves pinnately dissected, opposite; styles pubescent within, spirally coiled at maturity. Annual with low spreading stems; petals pink, slightly exceeding the sepals ..... 2. ERODIUM.

1. GERANIUM L. Cranesbill

Petals 2 to 8 mm. long, equaling or exceeding the calyx; pubescent or puberulent annuals or biennials. Stems 10 to 50 cm. long, spreading or decumbent; leaves reniform.
Sepals not bristle-tipped.
Petals deep purple, obovate, truncate or emarginate; stamens 10. 1. G. molle.
Petals violet or paler, cuneate, emarginate; stamens 5 ..... 2. G. pusillum.
Sepals bristle-tipped, the awns 1 to 2 mm. long. Plants more or less pubescent.
Inflorescence compact; petals pink or whitish ..... 3. G. carolinianum.
Inflorescence open; pedicels filiform, 1 to 4 cm. long; petals rose-purple. 4. G. bicknellii.
Petals 1 to 3 cm. long, obovate to oblong, rounded or emarginate; sepals with subulate tips; perennials.
Petals narrowly obovate or oblong, dark purple, 12 to 15 mm. long. Plant 10 to 90 cm. high, pubescent, not glandular; ultimate leaf segments obtuse or acutish ..... 7. G. atropurpureum.

Petals obovate or obcordate, white, pink, or purple.
Plants with few or solitary stems, not cespitose, 40 to 90 cm. high. Ultimate leaf segments lanceolate or lance-ovate, acute; style column glandular-pilose.
Pubescence tipped with purple glands; leaves glabrous to sparingly pilose; petals white, with roseate veins_____5. G. richardsonii.
Pubescence glandular-viscid, more or less dense and retrorse; leaves more or less pilose; petals purple or rose-colored, rarely white. 6. G. viscosissimum.
Plants more or less cespitose, 10 to 40 cm. high. Stems more or less retrorsely pubescent; petals pink to rose-purple, rarely white; pedicels and style column glandular-pubescent.
Ultimate leaf segments lance-ovate, acute; petals scarcely emarginate. 8. G. caespitosum.
Ultimate leaf segments broadly ovate, acutish; petals distinctly emarginate_____9. G. fremontii.

1. Geranium molle L. Sp. Pl. 682. 1753.

About settlements in the northwestern United States; not definitely known from the Great Basin; introduced from Europe. Maine to North Carolina, westward to British Columbia and California.

2. Geranium pusillum Burm. f. Spec. Bot. Ger. 27. 1759.

Waste places about settlements; introduced from Europe. Ontario to Virginia, westward to British Columbia and Utah.

3. Geranium carolinianum L. Sp. Pl. 682. 1753.

Fields, canyons, and mountain sides, upward to the aspen belt. Newfoundland to Alaska, southward throughout the United States.

4. Geranium bicknellii Britton, Bull. Torrey Club **24**: 92. 1897.
Geranium carolinianum longipes S. Wats. in King, Geol. Expl. 40th Par. **5**: 50. 1871.

Fields and canyons of the artemisia and pinyon belts. Nova Scotia to Alaska, southward to New York, Colorado, and California.

5. Geranium richardsonii Fisch. & Trauty. Ind. Sem. Hort. Petrop. **4**: 37. 1837.

Aspen and spruce belts. Saskatchewan to New Mexico, westward to British Columbia and California.

6. Geranium viscosissimum Fisch. & Mey. Ind. Sem. Hort. Petrop. **11**: Suppl. 18. 1846.
Geranium strigosum Rydb. Bull. Torrey Club **29**: 243. 1902.

Canyons and mountain sides of the pinyon, yellow pine, aspen, and spruce belts. Saskatchewan to Colorado, westward to British Columbia and California.

7. Geranium atropurpureum Heller, Bull. Torrey Club **25**: 195. 1898.

Plains, foothills, and canyons of the artemisia, pinyon, yellow pine, and aspen belts. Colorado and southern Utah, southward to Mexico.

8. Geranium caespitosum James in Long, Exped. **2**: 3. 1823.
? *Geranium marginale* Rydb.; Hanks & Small, N. Amer. Fl. **25**: 16. 1907.

Plains and foothills. Colorado, Wyoming, and Utah (?).

9. Geranium fremontii Torr.; A. Gray, Mem. Amer. Acad. n. ser. **4**: 26. 1849.
Pinyon, yellow pine, aspen, and spruce belts. Colorado, Utah, New Mexico, and Arizona.

2. ERODIUM L'Hér.

1. Erodium cicutarium (L.) L'Hér.; Ait. Hort. Kew. **2**: 414. 1789. ALFILERIA.
Geranium cicutarium L. Sp. Pl. 680. 1753.
Waste ground, canyons, and mountain sides, upward to the aspen belt; introduced from Europe. Canada to Virginia, westward to California and Mexico.

66. LINACEAE. Flax Family

Annual or perennial herbs (our species); leaves alternate or opposite, estipulate, sessile, mostly linear; flowers 5-merous, axillary or terminal, in corymbs or panicles; stamens monadelphous; style 5; ovary 5-celled (or 10-celled by false partitions); ovules 2 in each cell; capsule 5 to 10-seeded; seeds lenticular.

1. LINUM L. FLAX

Petals blue (sometimes white), 1 to 2 cm. long; stigmas introrse, elongate.
Plants 10 to 80 cm. high; leaves linear to linear-lanceolate.
Inner sepals ciliate——1. L. usitatissimum.
Inner sepals not ciliate——2. L. lewisii.
Petals yellow; stigmas capitate.
Stem and leaves puberulent. Plant 10 to 20 cm. high; sepals glandular-ciliate, 3-ribbed——3. L. puberulum.
Stems and leaves glabrous or nearly so.
Leaves imbricated, oblong to linear-oblong; sepals gland-toothed, ovate, equaling the capsule.
Leaves acute, 1 cm. long or more; outer sepals acuminate; stems 15 to 30 cm. high——4. L. kingii.
Leaves mostly obtuse, 2 to 8 mm. long; outer sepals obtuse or acutish; stems 10 cm. high or less——4a. L. kingii sedoides.
Leaves scattered, linear to linear-spatulate; sepals aristate-acuminate.
Stems 20 to 40 cm. high.
Outer sepals copiously gland-dotted; staminodia wanting or entire.
5. L. aristatum.
Outer sepals with few glands; staminodia 2-lobed.
5a. L. aristatum subteres.

1. Linum usitatissimum L. Sp. Pl. 277. 1753. FLAX.
In cultivation; occasionally escaped in old fields. Native of Europe.

2. Linum lewisii Pursh, Fl. Amer. Sept. 210. 1814. PRAIRIE FLAX.
Slopes, canyons, and open flats of the artemisia belt, upward to the spruce belt. Manitoba to Alaska, southward to Texas, California, and Mexico.

3. Linum puberulum (Engelm.) Heller, Pl. World **1**: 22. 1897.
Linum rigidum puberulum Engelm. in A. Gray, Pl. Wright. 1: 25. 1852.
Plains and dry hillsides of the Covillea, artemisia, and pinyon belts. Colorado to Texas, Arizona, and Nevada.

4. Linum kingii S. Wats. in King, Geol. Expl. 40th Par. **5**: 49. 1871.
Aspen and spruce belts. Wyoming and Utah.

4a. Linum kingii sedoides Porter, Rep. U. S. Geol. Surv. Terr. **4**: 474. 1871.
Linum kingii pinetorum Jones, Proc. Calif. Acad. II. **5**: 228. 1895.
Yellow pine, aspen, and spruce belts. Utah.

5. Linum aristatum Engelm. in Wisliz. Mem. North. Mex. 101. 1848.

Plains and dry hillsides of the Covillea and artemisia belts. Western Texas to southeastern Utah and southward.

5a. Linum aristatum subteres Trel. in A. Gray, Syn. Fl. 1[1]: 347. 1897.

Plains and dry hillsides of the Covillea and artemisia belts. Southern Utah and Nevada.

67. ZYGOPHYLLACEAE. Caltrop Family

Perennial herbs or shrubs (rarely trees), often yielding a bitter gum; leaves opposite, compound; flowers solitary, perfect, commonly 5-merous; sepals free or nearly so; petals free; stamens 10 or more, the anthers versatile; ovary 2 to many-celled, with central placenta; styles united; fruit capsular, the 1-seeded carpels often separating from each other and from the slender central axis.

Stipules spinescent. Diffusely branching undershrubs; stems spinulose above; leaflets rhombic-ovate, 10 mm. long; petals rose-colored; fruit ovate, 5-angled----------1. **FAGONIA.**

Stipules not spinescent.

Plant a shrub, 1 to 3 meters high; leaves evergreen, glutinous, 2-foliolate, the leaflets falcate, united at base, 1 cm. long or less; petals yellow; fruit globose, villous or tomentose----------2. **COVILLEA.**

Plant a prostrate herb; leaves 6 to 10-foliolate, pubescent, the leaflets small, oblong; petals yellow, small; fruit globular, armed with 2 to 4 prickles. 3. **TRIBULUS.**

1. FAGONIA L.

1. Fagonia californica Benth. Bot. Voy. Sulph. 10. 1844.

Plains and hillsides of the Covillea belt. Southern Utah to California, southward to Mexico.

2. COVILLEA Vail. Creosote-bush

1. Covillea tridentata (DC.) Vail, Bull. Torrey Club **26**: 302. 1899.

Zygophyllum tridentatum DC. Prodr. **1**: 706. 1824.

Larrea glutinosa Engelm. in Wisliz. Mem. North. Mex. 93. 1848.

Covillea glutinosa Rydb. N. Amer. Fl. **25**: 108. 1910.

Plains and hillsides, forming a distinct and characteristic belt, upward to 1,100 meters; southern Nevada and southwestern Utah. Western Texas to California and Mexico.

3. TRIBULUS L. Caltrop

1. Tribulus terrestris L. Sp. Pl. 387. 1753.

Introduced from the Mediterranean region; Provo, Utah. The dry, hard, horned fruits often adhere to bicycle and automobile tires.

68. RUTACEAE. Rue Family

Armed or unarmed, aromatic herbs or shrubs; leaves alternate, estipulate, simple or compound, glandular-punctate; flowers perfect or polygamous, inconspicuous, cymose or in racemose clusters; sepals and petals 4 or 5; stamens 5 to 10; ovary of 2 or 3 united carpels; fruit a capsule or samara.

Leaves simple, small, linear or scalelike; flowers purple; capsule yellowish green, glandular-punctate, 2-celled, 4 to 6-seeded, each cell globular or ovate, 1 cm. long or less; strong-scented undershrubs with punctate bark----------1. **THAMNOSMA.**

Leaves 3-foliolate; leaflets oblong to rhombic; flowers greenish; fruit a 2- (or 3) celled reticulate samara, flattened, broad-winged all around; unarmed shrubs----------2. **PTELEA.**

1. THAMNOSMA Torr. & Frém.

1. **Thamnosma montana** Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 313. 1845.

Plains and slopes of the Covillea belt. Southern Utah to southeastern California and southward.

2. PTELEA L. HOPTREE

1. **Ptelea baldwinii** Torr. & Gray, Fl. N. Amer. 1: 215. 1838.
Ptelea angustifolia Benth. Pl. Hartw. 9. 1839.

Covillea belt. Florida to Texas, Utah, and California, southward to Mexico.

69. MELIACEAE. Chinaberry Family

1. MELIA L.

1. **Melia azedarach** L. Sp. Pl. 384. 1753. CHINABERRY.

In cultivation and often escaped in southern Nevada. It reaches a height of 10 meters or more, and is much esteemed as as hade tree. Leaves bipinnate; leaflets ovate, acuminate, serrate, glossy; flowers in panicles, pale lavender, 5 or 6-merous; stamens monadelphous, the stamen tube purple; fruit pulpy, several-seeded, 10 to 15 mm. in diameter.

70. POLYGALACEAE. Milkwort Family

(Contributed by S. F. Blake)

Herbaceous or shrubby plants; leaves estipulate, simple, alternate, opposite, or verticillate; flowers white or purple, subaxillary or racemose, irregular, hypogynous; petals commonly 3, united below and to the stamen tube, the middle petal keel-shaped, crested or beaked; stamens 4 to 8, monadelphous or diadelphous; style 1; ovary 2-(rarely 1-)celled; ovules solitary; fruit a capsule.

1. POLYGALA L. POLYGALA

Undershrubs, 5 to 13 cm. high, ascending-branched; leaves obovate to elliptic, mucronulate, 1 to 2 cm. long, 3 to 6 mm. wide; flowers pink-purple and yellow, 10 to 11 mm. long; capsule 6 to 7 mm. long, 4.5 mm. wide.
1. P. subspinosa.

Undershrubs, 10 to 90 cm. high, intricately branched; leaves spatulate or linear-spatulate, 6 to 17 mm. long, 1 to 2.5 mm. wide; flowers yellowish, 3.8 to 5 mm. long; capsule 4.5 to 4.8 mm. long, 3.3 to 3.5 mm. wide.

Stems densely pilosulous with wide-spreading hairs; leaves puberulous with spreading hairs; sepals spreading-puberulous------**2. P. acanthoclada.**

Stems densely canescent-tomentose with incurved or reflexed matted hairs; leaves sparsely puberulous with incurved hairs; sepals glabrous.
2a. P. acanthoclada intricata.

1. **Polygala subspinosa** S. Wats. Amer. Nat. 7: 299. 1873.

Plains and dry hillsides of the artemisia and pinyon belts. Western Colorado to Arizona and southwestern California.

2. Polygala acanthoclada A. Gray, Proc. Amer. Acad. **11**: 73. 1876.

Plains and dry hillsides of the Covillea and lower artemisia belts. Western Colorado to Nevada and southward.

2a. Polygala acanthoclada intricata Eastw. Proc. Calif. Acad. II. **6**: 283. 1896.

Barton Range, San Juan County, Utah.

71. EUPHORBIACEAE. Spurge Family

(Contributed by J. B. S. Norton)

Herbs or shrubs, often with milky juice; leaves in our species simple; inflorescence various; flowers monoecious or dioecious; corolla, and sometimes calyx, often wanting, the minute involucre in some genera simulating a perfect petaloid flower; hypogynous disk present; ovary superior, usually 3-celled; ovules 1 or 2 in each cell, suspended, anatropous, the micropyle external.

Flowers with a minute, cuplike, 4 or 5-lobed involucre, usually with glands between the lobes, surrounding the many staminate flowers and a central, pistillate flower. Calyx represented by the articulation of the single stamen with its pedicel, and a ring at base of the ovary; plants with milky juice.

Leaves all opposite; glands usually with petaloid appendages. **3. CHAMAESYCE.**

Leaves of lower part of stem alternate or scattered; glands of involucre without petaloid appendages, sometimes with crescent-shaped horns.

Involucres cymose, clustered, each with a single gland; stipules gland-like. Leaves ovate to linear, coarsely dentate, 2 to 8 cm. long. **1. POINSETTIA.**

Involucres in branching umbels; glands 4; stipules none. **2. TITHYMALUS.**

Flowers without a perianth-like involucre; calyx of several sepals.

Petals present, at least in the staminate flowers; stamens 6, incurved in bud. Pubescence stellate **4. CROTON.**

Petals wanting; stamens erect.

Plants stellate-pubescent shrubs. Leaves ovate-oblong, repand-dentate; flowers small, in axillary racemes; stamens 3 to 20. **5. BERNARDIA.**

Plants perennial herbs, glabrous or with stinging hairs. Stamens 2 to 5.

Plants covered with stinging hairs; bracts not glandular; leaves lanceolate to triangular-lanceolate, 1 to 5 cm. long, serrate. **6. TRAGIA.**

Plants glabrous; bracts 2-glandular; leaves narrow, glabrous, shining, 3 to 8 cm. long, few-toothed. Spikes terminal **7. STILLINGIA.**

1. POINSETTIA Graham. Poinsettia

1. Poinsettia dentata (Michx.) Klotzsch & Garcke, Monatsb. Preuss. Akad. Wiss. Berlin **1859**: 253. 1859.

Euphorbia dentata Michx. Fl. Bor. Amer. **2**: 211. 1803.

Plains and mountain sides, upward to the yellow pine belt; Salt Lake City. Pennsylvania to South Dakota and Utah, southward to Mexico.

2. TITHYMALUS Adans.

Involucral glands rounded. Capsule tuberculate; seeds reticulate; leaves serrulate, the lower more than twice as long as wide; upper stem leaves subauriculate; floral leaves oblong to ovate_____1. T. missouriensis.
Involucral glands 2-horned or dentate on margin. Seeds irregularly pitted or smooth; leaves entire or nearly so.
Horns longer than body of the gland; thin-leaved annuals or biennials.
Leaves denticulate; seeds shallow-pitted_____2. T. crenulatus.
Leaves entire; seeds almost smooth_____3. T. mancus.
Horns not longer than body of the gland; thick-leaved perennials, many-stemmed, and scaly at base.
Glands crescent-shaped, the horns longer than the teeth, if any, between them; involucral lobes triangular-ovate.
Capsules 5 mm. long; glands usually dentate, about 2 mm. broad; stem leaves linear-lanceolate to oblong, glaucous____8. T. chamaesula.
Capsules smaller; glands usually entire, about 1 mm. broad; stem leaves triangular-ovate.
Stems slender; floral leaves 1 cm. wide or less_____9. T. philorus.
Stems stout; floral leaves over 1 cm. wide_____10. T. robustus.
Glands about 2 mm. broad, fan-shaped, the margin toothed; horns short, if any; involucral lobes oblong, truncate or incised.
Stem leaves ovate to elliptic or oblanceolate, pointed; stems slender and often sinuous, glabrous or pubescent_____7. T. schizolobus.
Stem leaves broadest above the middle, generally rounded at apex, microscopically granulate; stem stout.
Floral leaves broader than long.
Plant glabrous; leaves ovate to oblong, obtuse to pointed.
4. T. palmeri.
Plant pubescent; leaves obovate, retuse_____5. T. subpubens.
Floral leaves about as broad as long.
Stem leaves obovate, obtuse_____6. T. luridus.
Stem leaves oblanceolate, acute_____6a. T. luridus pringlei.

1. Tithymalus missouriensis (Norton) Small, Fl. Southeast. U. S. 721. 1903.
Euphorbia arkansana missouriensis Norton, Rep. Mo. Bot. Gard. 11: 103. 1899.

Plains and hillsides; Antelope Island. Missouri to South Dakota, Colorado, and eastern Washington.

2. Tithymalus crenulatus (Engelm.) Heller, Muhlenbergia 1: 55. 1904.
Euphorbia crenulata Engelm. in Torr. U. S. & Mex. Bound. Bot. 192. 1859.

Open woods. Oregon, California, and western Nevada.

3. Tithymalus mancus (A. Nels.) Heller, Muhlenbergia 6: 67. 1913.
Euphorbia manca A. Nels. Bot. Gaz. 47: 437. 1909.

Valleys and hillsides, upward to 2,100 meters. Colorado and New Mexico.

4. Tithymalus palmeri (Engelm.) Abrams, Fl. Los Angeles 216. 1917.
Euphorbia palmeri Engelm. in Brewer & Wats. Bot. Calif. 2: 75. 1880.

Pinyon and yellow pine belts; Marysvale, Utah. California to Arizona and Utah.

5. Tithymalus subpubens (Engelm.) Norton.
Euphorbia subpubens Engelm. in S. Wats. Bot. Calif. 2: 76. 1880.

Yellow pine belt. Arizona.

6. Tithymalus luridus (Engelm.) Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 145. 1913.

Euphorbia lurida Engelm. Proc. Amer. Acad. **5**: 173. 1861.

Yellow pine areas. Utah, Arizona, and New Mexico.

6a. Tithymalus luridus pringlei Norton.

Euphorbia lurida pringlei Norton, Rep. Mo. Bot. Gard. **11**: 123. *pl. 39*. 1899.

Panguitch Lake, Utah; also Arizona.

7. Tithymalus schizolobus (Engelm.) Norton.

Euphorbia schizoloba Engelm. Proc. Amer. Acad. **5**: 173. 1862.

Plains and hillsides of the Covillea and artemisia belts. California, Arizona, and southern Nevada.

8. Tithymalus chamaesula (Boiss.) Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 145. 1913.

Euphorbia chamaesula Boiss. Cent. Euphorb. 38. 1860.

Open flats and yellow pine areas. New Mexico and Arizona to Mexico.

9. Tithymalus philorus Cockerell, Muhlenbergia **4**: 56. 1908.

Euphorbia montana Engelm. in Torr. U. S. & Mex. Bound. Bot. 192. 1859. Not *E. montana* Raf. 1817.

Meadows of the pinyon, yellow pine, and aspen belts; southern Utah.

10. Tithymalus robustus (Engelm.) Small; Rydb. Colo. Agr. Exp. Sta. Bull. 100: 224. 1906.

Euphorbia montana robusta Engelm. in Torr. U. S. & Mex. Bound. Bot. 192. 1859.

Plains, canyons, and mountain sides, upward to the yellow pine belt. Nebraska to Montana, southward to Arizona.

3. CHAMAESYCE S. F. Gray

Leaves toothed, at least at apex.

Plants pubescent.

Plant prostrate; hairs appressed; seeds transversely striate. **14. C. maculata.**

Plant erect; hairs spreading; seeds wrinkled **15. C. capitellata.**

Plants glabrous.

Seeds strongly transverse-striate; leaves small, falcate or broader at base. **11. C. glyptosperma.**

Seeds pitted or irregularly wrinkled; leaves narrowed toward base.

Seeds deeply and irregularly pitted; leaves usually elliptic. **12. C. rugulosa.**

Seeds faintly pitted and more pointed; leaves cuneate or obovate to oblong **13. C. serpyllifolia.**

Leaves entire.

Leaves linear to narrowly lanceolate, glabrous; plants erect or ascending.

Appendages small or none.

Capsule less than 1.5 mm. long. Seeds wrinkled **1. C. revoluta.**

Capsule 2 mm. long or more.

Stem low and erect; stipules subulate; seeds finely granulate, obscurely angled **2. C. parryi.**

Stem long, ascending; stipules triangular; seeds smooth, 3-angled. **3. C. flagelliformis.**

Leaves 1 to 2 times as long as wide; plants prostrate or sometimes ascending.
Plants glabrous.
Median leaves acute, ovate to lanceolate.
Plant annual; seeds smooth; appendages of glands inconspicuous. **4. C. arenicola.**
Plant perennial; seeds wrinkled; appendages as wide as the glands or wider. Stems ascending **5. C. chaetocalyx.**
Median leaves obtuse. Perennials.
Appendages rarely as wide as the gland, often wanting; stipules subulate; seeds wrinkled **6. C. fendleri.**
Appendages large, white; stipules triangular, fimbriate; seed smooth. **7. C. albomarginata.**
Plant pubescent, at least on stipules.
Appendages laciniate. Leaves mostly obovate **10. C. setiloba.**
Appendages of glands notched, entire, or none.
Pubescence scanty, not glandular **8. C. polycarpa.**
Pubescence abundant, glandular **9. C. versicolor.**

1. Chamaesyce revoluta (Engelm.) Small, Fl. Southeast. U. S. 711. 1903.
Euphorbia revoluta Engelm. in Torr. U. S. & Mex. Bound. Bot. 181. 1859.

Rocky hillsides and canyons, upward to the yellow pine belt. Western Texas to Arizona, southward into Mexico.

2. Chamaesyce parryi (Engelm.) Rydb. Bull. Torrey Club **40**: 53. 1913.
Euphorbia parryi Engelm. Amer. Nat. **9**: 350. 1875.

Plains and sandhills of the Covillea belt. Arizona, southern Nevada, and southwestern Utah.

3. Chamaesyce flagelliformis (Engelm.) Rydb. Colo. Agr. Exp. Sta. Bull. **100**: 223. 1906.
Euphorbia petaloidea flagelliformis Engelm. in Torr. U. S. & Mex. Bound. Bot. 185. 1859.

Plains and sandhills of the Covillea and artemisia belts; southern Utah. Colorado, Utah, New Mexico, and Arizona.

4. Chamaesyce arenicola (Parish) Millsp. Field Mus. Bot. **2**: 408. 1916.
Euphorbia arenicola Parish, Erythea **7**: 93. 1899.

Desert areas of the Covillea and artemisia belts. Nevada.

5. Chamaesyce chaetocalyx (Boiss.) Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 144. 1913.
Euphorbia fendleri chaetocalyx Boiss. in DC. Prodr. **15**^{2}: 39. 1862.

Plains, hillsides, and canyons of the Covillea, artemisia, and pinyon belts. Western Texas to Arizona and southern Utah.

6. Chamaesyce fendleri (Torr. & Gray) Small, Fl. Southeast. U. S. 710. 1903.
Euphorbia fendleri Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **2**^{2}: 175. 1855.

Plains and rocky canyons of the artemisia, pinyon, and yellow pine belts. Texas to Arizona, Utah, and Nevada.

7. Chamaesyce albomarginata (Torr. & Gray) Small, Fl. Southeast. U. S. 710. 1903.
Euphorbia albomarginata Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **2**^{2}: 174. 1855.

Plains and desert areas of the Covillea and artemisia belts; southern Utah and Nevada. Texas to southern Utah and California, southward to Mexico.

8. Chamaesyce polycarpa (Benth.) Millsp. Field Mus. Bot. **2**: 411. 1916.
Euphorbia polycarpa Benth. Bot. Voy. Sulph. 50. 1844.
Plains and sandy draws of the Covillea and artemisia belts. Southern Utah and Nevada, Arizona, and southern California.

9. Chamaesyce versicolor (Greene) Norton.
Euphorbia versicolor Greene, Bot. Gaz. **6**: 184. 1884.
Valleys and rocky canyons; Grand Canyon. Texas to Arizona.

10. Chamaesyce setiloba (Engelm.) Norton.
Euphorbia setiloba Engelm. in Torr. U. S. Rep. Expl. Miss. Pacif. **5**: 364. 1857.
Plains and canyons; northern Arizona. Arizona and California.

11. Chamaesyce glyptosperma (Engelm.) Small, Fl. Southeast. U. S. 712, 1333. 1903.
Euphorbia glyptosperma Engelm. in Torr. U. S. & Mex. Bound. Bot. 186. 1859.
Valleys and sandy draws of the artemisia belt. Ontario to British Columbia, southward to Texas and Mexico.

12. Chamaesyce rugulosa (Engelm.) Rydb. Bull. Torrey Club **33**: 145. 1906.
Euphorbia serpyllifolia rugulosa Engelm.; Millsp. Pittonia **2**: 85. 1890.
Valleys and hillsides, upward to 1,800 meters. Nevada.

13. Chamaesyce serpyllifolia (Pers.) Small, Fl. Southeast. U. S. 712, 1333. 1903.
Euphorbia serpyllifolia Pers. Syn. Pl. **2**: 14. 1806.
Moist alkaline soil and along stream banks of the Covillea, artemisia, pinyon, and yellow pine belts. Michigan to British Columbia, southward to Texas and Mexico.

14. Chamaesyce maculata (L.) Small, Fl. Southeast. U. S. 713, 1333. 1903.
Euphorbia maculata L. Sp. Pl. 455. 1753.
Waste places and open ground. Ontario to Florida, westward to Wyoming and Texas; introduced in California.

15. Chamaesyce capitellata (Engelm.) Millsp. Field Mus. Bot. **2**: 408. 1916.
Euphorbia capitellata Engelm. in Torr. U. S. & Mex. Bound. Bot. 188. 1859.
Plains and yellow pine areas; near Grand Canyon, Arizona.

4. CROTON L.

Plant annual; leaves lanceolate to oblong——1. C. texensis.
Plant perennial; leaves elliptic to ovate——2. C. longipes.

1. Croton texensis (Klotzsch) Muell. Arg. in DC. Prodr. **15²**: 692. 1866.
Hendecandras texensis Klotzsch in Weigmann, Archiv. Naturg. **7**: 252. 1841.
Plains and mountain sides of the Covillea and artemisia belts. Illinois to Wyoming, southward to Alabama, Texas, and Mexico.

2. Croton longipes Jones, Proc. Calif. Acad. II. **5**: 721. 1895.
Valleys and hillsides of the Covillea, artemisia, and pinyon belts. Utah, northern Arizona, and Nevada.

5. BERNARDIA P. Br.

1. Bernardia myricaefolia (Scheele) Benth. & Hook. Gen. Pl. **3**: 308. 1883.
Tyria myricaefolia Scheele, Linnaea **25**: 581. 1852.
Hillsides and rocky canyons; Grand Canyon. Western Texas to Arizona and Mexico.

6. TRAGIA L.

1. Tragia ramosa Torr. Ann. Lyc. N. Y. **2**: 245. 1828.

Plains and dry hillsides of the artemisia, pinyon, and yellow pine belts; northern Arizona. Missouri to Colorado, Texas, and Arizona.

7. STILLINGIA L.

1. Stillingia paucidentata S. Wats. Proc. Amer. Acad. **14**: 298. 1879.

Desert areas; Mohave Desert, Southern California.

72. CALLITRICHACEAE. Waterstarwort Family

Slender aquatic herbs; leaves opposite; flowers axillary, solitary, polygamous; calyx and corolla wanting; staminate flowers consisting of 1 stamen; pistillate flowers of a single 4-celled ovary, bearing 2 distinct stigmas; fruit nutlike, 4-lobed, 4-celled, separating into four 1-seeded portions.

1. CALLITRICHE L.

Leaves similar, linear, 1-ribbed; fruit orbicular, 1 to 2 mm. long, winged. ..... **1. C. autumnalis.**

Leaves dissimilar, the upper (floating) obovate, 3-ribbed, the lower (submerged) linear; fruit obovoid, about 1.5 mm. long, winged. ..... **2. C. palustris.**

1. Callitriche autumnalis L. Fl. Suec. ed. 2. 2. 1755.

In shallow water of the artemisia belt, upward to the spruce belt. Quebec to New York, Utah, and Oregon; also in the Old World.

2. Callitriche palustris L. Sp. Pl. 969. 1753.

In running water of the artemisia belt, upward to the spruce belt. Newfoundland to Florida, westward to Alaska and California; also in the Old World.

73. LIMNANTHACEAE. False-mermaid Family

Annual herbs (our species) with alternate, 1 to 3 times pinnately dissected, estipulate leaves; flowers solitary, on axillary peduncles, 3 to 5-merous; sepals persistent; petals alternate with as many glands; stamens twice as many as the petals; ovary 2 or 3-celled; fruit 2 or 3-lobed, indehiscent.

1. FLOERKEA Willd.

1. Floerkea occidentalis Rydb. Mem. N. Y. Bot. Gard. **1**: 268. 1900.

Along streams and in springy places of the artemisia and pinyon belts. Montana to Colorado, westward to Washington and California.

74. ANACARDIACEAE. Cashew Family

Erect or trailing shrubs or trees; leaves estipulate, simple to pinnately compound; inflorescence racemose or paniculate; flowers regular, monoecious, dioecious, or polygamous; sepals and petals 3 to 6, the latter inserted on a hypogynous disk; stamens 3 to 6, alternate with the petals; ovary mostly 1-celled; styles 1 to 3; fruit a small drupe.

Leaves 3-foliolate (in our species), the leaflets rhombic-ovate to orbicular, 3 to 10 cm. long, coarsely toothed; petals greenish or yellowish white; drupes white, smooth, shining ..... **1. TOXICODENDRON.**

Leaves simple to pinnately compound; petals greenish or yellowish white; drupe red, puberulent ..... **2. RHUS.**

1. TOXICODENDRON Mill. Poison-ivy

1. Toxicodendron rydbergii (Small) Greene, Leaflets 1: 117. 1905.
Rhus rydbergii Small in Rydb. Mem. N. Y. Bot. Gard. 1: 268. 1900.
Toxicodendron longipes Greene, Leaflets 1: 118. 1905.
Canyons of the pinyon and yellow pine belts. South Dakota to British Columbia, southward to Kansas, Arizona, and Oregon.

2. RHUS L. Sumac

Leaves simple, suborbicular to reniform, crenate or shallowly lobed, 1 to 3 cm. long, pubescent beneath ..... 1. R. utahensis.
Leaves 3-foliolate to pinnate.
Leaves 3-foliolate, the leaflets obovate-cuneate to rhombic-obovate, crenate to irregularly lobed, pubescent to glabrate ..... 2. R. trilobata.
Leaves pinnate, with 11 to 31 leaflets, these oblong-lanceolate, serrate, pale or glaucous, glabrous ..... 3. R. cismontana.

1. Rhus utahensis Goodding, Bot. Gaz. 37: 57. 1904.
Schmaltzia affinis Greene, Leaflets 1: 135. 1905.
Rocky hillsides and canyons of the artemisia and pinyon belts. Southern Utah, Arizona, and southeastern California.

2. Rhus trilobata Nutt.; Torr. & Gray, Fl. N. Amer. 1: 219. 1838.
Schmaltzia oxyacanthoides Greene, Leaflets 1: 134. 1905.
Plains and mountain sides of the Covillea, artemisia, and pinyon belts. Saskatchewan to Texas, westward to Washington and California.

3. Rhus cismontana Greene, Proc. Washington Acad. Sci. 8: 189. 1906.
Plains and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. South Dakota to Wyoming, southward to Missouri and Arizona.

75. CELASTRACEAE. Bittersweet Family

Shrubs with opposite or alternate, estipulate leaves; flowers small, solitary or in cymes, 4 or 5-merous; calyx deeply 4 or 5-parted, with a disk surrounding the ovary; petals inserted below the disk; stamens as many or twice as many as the petals and alternate with them; ovary 1 to 5-celled; style short; fruit follicular or a 2 to 5-celled, loculicidal capsule; seeds arillate.

Leaves opposite, petioled.
Plant a large deciduous shrub; leaves elliptic to lanceolate, serrate, mostly acuminate, 3 to 7 cm. long; flowers 5-merous, purple; capsule lobed, with one or more seeds in each cell ..... 1. EUONYMUS.
Plant an evergreen undershrub; leaves elliptic to subspatulate, revolute, entire or crenulate, 1 to 3 cm. long; flowers 4-merous, greenish; ovary 2-celled; capsules ovoid, 1 to 2-seeded ..... 2. PACHISTIMA.
Leaves alternate or fasciculate.
Twigs yellowish, hispid or puberulent; leaves very thick, broadly elliptic, entire, revolute, 1.5 cm. long or less; flowers 5-merous; ovary 5-celled, with 2 ovules to the cell; fruit 1-celled by abortion, 1-seeded. 4. MORTONIA.
Twigs brownish or olive; leaves entire, spatulate or oblanceolate, about 1 cm. long; flowers 4 or 5-merous, white; stamens 10; ovary 1-celled, 2-ovuled; fruit follicular. Intricately branched, spinescent shrub. 3. FORSELLESIA.

1. EUONYMUS L. Euonymus

1. **Euonymus occidentalis** Nutt.; Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 74. 1857.

Along streams in forests; near Carson City. Washington to California and Nevada.

2. PACHISTIMA Raf.

1. **Pachistima myrsinites** (Pursh) Raf. Amer. Month. Mag. **2**: 176. 1818.

Myrtle pachistima.

Ilex myrsinites Pursh, Fl. Amer. Sept. 119. 1814.

Pinyon belt, and upward to the subalpine belt. British Columbia to California and New Mexico.

3. FORSELLESIA Greene

Leaves tipped with a spine_____1. **F. pungens.**
Leaves mucronate.
Leaves about 2 mm. wide; flowers mostly 5-merous____2. **F. spinescens.**
Leaves 3 to 5 mm. wide; flowers 4-merous_____3. **F. nevadensis.**

1. **Forsellesia pungens** (T. S. Brandeg.) Heller, Cat. N. Amer. Pl. ed 2. 8. 1900.

Glossopetalon pungens T. S. Brandeg. Bot. Gaz. **27**: 445. 1899.

Rocky places of the artemisia and pinyon belts; Sheep Mountains, Nevada.

2. **Forsellesia spinescens** (A. Gray) Greene, Erythea **1**: 206. 1893.

Glossopetalon spinescens A. Gray, Pl. Wright. **2**: 29. *pl. 12, f. B*. 1853.

Canyons and dry hillsides of the artemisia and pinyon belts. Colorado to western Texas, California, and Oregon.

3. **Forsellesia nevadensis** (A. Gray) Greene, Erythea **1**: 206. 1893.

Glossopetalon nevadensis A. Gray, Proc. Amer. Acad. **11**: 73. 1876.

Canyons and dry hillsides of the artemisia and pinyon belts. Nevada and Oregon.

4. MORTONIA A. Gray

1. **Mortonia utahensis** (Coville) A. Nels. Bot. Gaz. **47**: 427. 1909.

Mortonia scabrella utahensis Coville; Trel. in A. Gray, Syn. Fl. 1^1: 400. 1897.

Canyons and hillsides of the Covillea belt. Southwestern Utah and Arizona to California.

76. ACERACEAE. Maple Family

Shrubs or trees with opposite, simple or compound leaves; flowers corymbose or racemose, polygamous or dioecious; calyx usually 5-parted; petals usually 5, inserted on a disk; stamens 3 to 12; styles 2; ovary 2-celled, with 2 ovules in each cell; fruit a double winged samara, with one seed in each cell.

1. ACER L. Maple

Leaves simple, glabrous; flowers corymbose.
Mature leaves reniform to orbicular, 5-lobed, the lobes large-toothed, with rounded sinuses; samaras divergent, about 3 cm. long.
1. A. grandidentatum.
Mature leaves broadly cordate to reniform, 3-lobed or 3-foliolate, the lobes incised; sinuses acute; samaras divergent, 2 to 3 cm. long.
2. A. glabrum.

Leaves 3 or 5-foliolate; flowers corymbose or racemose.
Leaves palmately 3-foliolate; flowers corymbose (see above).
2. A. glabrum.
Leaves pinnately 3 or 5-foliolate; leaflets ovate to rhombic, coarsely toothed, acuminate, pubescent; samaras convergent----------**3. A. interius.**

1. Acer grandidentatum Nutt.; Torr. & Gray, Fl. N. Amer. 1: 247. 1838.
BIGTOOTH MAPLE.

Along watercourses in canyons of the artemisia, pinyon, yellow pine, and aspen belts. Montana and Idaho, southward to western Texas and Arizona.

2. Acer glabrum Torr. Ann. Lyc. N. Y. 2: 172. 1828. ROCKY MOUNTAIN MAPLE.
Acer tripartitum Nutt.; Torr. & Gray, Fl. N. Amer. 1: 247. 1838.
Acer diffusum Greene, Pittonia 5: 2. 1902.

Canyons and mountain sides of the pinyon, yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to New Mexico and California.

3. Acer interius Britton, N. Amer. Trees 655. *f. 608*. 1908. BOXELDER.
Acer kingii Britton, N. Amer. Trees 656. 1908.

Along watercourses of the artemisia and pinyon belts. Manitoba to Nebraska, Montana, and Arizona.

77. RHAMNACEAE. Buckthorn Family

Shrubs or small trees, unarmed or with spinulose branches; leaves simple, pinnately veined or 3 to several-ribbed; stipules caducous; flowers small, greenish, white, or bluish, perfect or polygamous, 4 or 5-merous; calyx tube obconic, 4 or 5-lobed; petals inserted on the calyx; stamens opposite the petals; ovary 2 to 5-celled, the ovules solitary in each cell; styles 2 to 5 (commonly 3); fruit a berry or capsule.

Leaves alternate, pinnately veined; flowers in axillary racemes, cymes, or umbels; petals short-clawed, hooded; ovary sessile, not immersed; fruit a drupe----------**1. RHAMNUS.**
Leaves alternate and 3-ribbed or opposite and pinnately veined; flowers in terminal panicles, cymes, or umbels; petals clawed, hooded; ovary immersed in the disk; fruit a 3-celled 3-lobed capsule------**2. CEANOTHUS.**

1. RHAMNUS L. BUCKTHORN

Leaves tomentulose beneath, ovate-oblong to oblong-lanceolate, obtuse or acute, entire or serrulate, 2 to 7 cm. long. Peduncles exceeding the petioles; fruit subglobose, black----------**4. R. tomentella.**
Leaves glabrous or nearly so.
Leaf-blades elliptic to ovate-lanceolate, 4 to 11 cm. long, thin, puberulent to glabrate. Flowers solitary or in few-flowered clusters; fruit purple or black, depressed-globose----------**1. R. betulaefolia.**
Leaf blades oblong to obovate-oblong or lanceolate, 6 cm. long or less (commonly less than 4 cm. long), glabrous or nearly so.
Leaves crenate, acute or acuminate; twigs gray to brown; fruit black, subglobose----------**2. R. smithii**
Leaves serrulate, obtuse to acute; twigs dark brown or red; fruit black, obovoid----------**3. R. rubra.**

1. Rhamnus betulaefolia Greene, Pittonia 3: 16. 1896.

Canyons of the artemisia and pinyon belts. Southeastern Utah, New Mexico, and Arizona.

2. Rhamnus smithii Greene, Pittonia 3: 17. 1896.

Pinyon and yellow pine belts. Southeastern Utah, southern Colorado, and northern New Mexico.

3. Rhamnus rubra Greene, Pittonia 1: 68, 160. 1887.

Canyons of the yellow pine belt. California and western Nevada.

4. Rhamnus tomentella Benth. Pl. Hartw. 303. 1848.

Along creeks in canyons; Sierra Nevada. Central and southern California to western Nevada (?). Perhaps outside our range.

2. CEANOTHUS L. CEANOTHUS

Leaves opposite, parallel-veined.

Leaves spinulose-toothed, obovate to spatulate or elliptic, cuneate, 1 to 2 cm. long, puberulent when young; flowers blue; capsule 8 to 10 mm. in diameter with 3 dorsal horns. Low, procumbent shrub.

1. C. prostratus.

Leaves entire or denticulate, 5 to 20 mm. long, thick, short-stalked, revolute; flowers white; capsule slightly oblong, 4 mm. in diameter. Twigs grayish to brownish, tomentulose.

Leaves spatulate to obovate-cuneate, mostly obtuse, tomentulose beneath; capsule with 3 conspicuous horns near the top; tall shrub.

2. C. cuneatus.

Leaves elliptic, obtuse or acute, tomentulose beneath, mostly less than 15 mm. long; capsule small-horned about the middle; low shrub.

3. C. greggii.

Leaves alternate, more or less distinctly 3-ribbed.

Leaves ample, 3 to 7 cm. long; petioles 5 to 10 mm. long. Tall shrubs; inflorescence ample.

Leaves broadly elliptic to cordate-ovate, evergreen, denticulate, pale and velutinous beneath; petals white; capsule subglobose, 3-lobed at top.

4. C. velutinus.

Leaves ovate to ovate-oblong, deciduous, mostly entire, glabrous or nearly so; flowers blue, varying to white; capsule subpyriform.

5. C. integerrimus.

Leaves normally small; petioles 4 mm. long or less. Inflorescence small; petals white.

Leaves glabrous or nearly so, oval to subrotund, obtuse, glandular-denticulate. Capsule about 4 mm. in diameter, nearly crestless.

6. C. martini.

Leaves pubescent to silky-canescent or tomentulose beneath.

Leaves glabrous or sparingly strigose above, elliptic, entire, pale and silky-canescent beneath; capsule subglobose, scarcely lobed.

7. C. fendleri.

Leaves pubescent to tomentulose above, elliptic to nearly round, denticulate; capsule about 4 mm. in diameter, evidently lobed at top.

8. C. cordulatus.

1. Ceanothus prostratus Benth. Pl. Hartw. 302. 1848. MAHALA-MATS.

In dense colonies on mountain sides of the yellow pine belt, and upward to 2,000 meters or more. Washington to California and western Nevada.

2. Ceanothus cuneatus (Hook.) Nutt.; Torr. & Gray, Fl. N. Amer. 1: 267. 1838.

Rhamnus cuneatus Hook. Fl. Bor. Amer. 1: 124. 1830.

Canyons and mountain sides of the yellow pine belt. Oregon to California and western Nevada.

3. Ceanothus greggii A. Gray, Pl. Wright. **2**: 28. 1853.

Plains, canyons, and slopes of the Covillea, artemisia, and pinyon belts. Western Texas to southern Nevada, southward to Mexico.

4. Ceanothus velutinus Dougl.; Hook. Fl. Bor. Amer. **1**: 125. 1830. SNOWBRUSH.

Mountain sides and canyons of the pinyon, yellow pine, and aspen belts. South Dakota to British Columbia, southward to Colorado and California.

5. Ceanothus integerrimus Hook. & Arn. Bot. Beechey Voy. 329. 1840.

Dry hills and mountain sides, upward to 1,800 meters; Emigrant Gap, Yosemite. Washington to California and western Nevada (?).

6. Ceanothus martini Jones, Contr. West. Bot. **8**: 41. 1898.

Ceanothus sorediatus glabra S. Wats. in King, Geol. Expl. 40th Par. **5**: 51. 1871.

Mountain sides of the pinyon, yellow pine, and aspen belts. Utah and Nevada.

7. Ceanothus fendleri A. Gray, Mem. Amer. Acad. n. ser. **4**: 29. 1849. FENDLER CEANOTHUS.

Canyons and mountain sides of the pinyon, yellow pine, aspen, and spruce belts. South Dakota to Wyoming, New Mexico, and Arizona.

8. Ceanothus cordulatus Kellogg, Proc. Calif. Acad. **2**: 124. *f. 39*. 1863.

Foothills and mountain sides of the yellow pine belt. Oregon, California, and western Nevada.

78. VITACEAE. Grape Family

Woody vines, climbing or trailing by tendrils; leaves large, simple or compound, estipulate; flowers perfect, polygamous, or dioecious, in axillary panicles or cymes, 4 or 5-merous; sepals minute; petals valvate; stamens opposite the petals; ovary 2-celled, with 2 ovules in each cell; style short or none; fruit a 4-seeded berry.

Leaves simple (in our species), cordate-ovate, toothed or lobed, white-woolly when young; panicles 5 to 8 cm. long; berry black, 1 cm. in diameter. **1. VITIS.**

Leaves palmately 5 or 7-foliolate, the leaflets lanceolate or oval, serrate, acute or acuminate; inflorescence 5 cm. broad or more, the pedicels divaricate; berry bluish black **2. PARTHENOCISSUS.**

1. VITIS L. GRAPE

1. Vitis arizonica Engelm. Amer. Nat. **2**: 321. 1868. CANYON GRAPE.

Near watercourses, in gulches and canyons of the Covillea belt, upward to the yellow pine belt. Western Texas to southern Utah, southeastern California, and Mexico.

2. PARTHENOCISSUS Planch. THICKET CREEPER

1. Parthenocissus vitacea (Knerr) Hitchc. Spr. Fl. Manhattan 26. 1894.

Ampelopsis quinquefolia vitacea Knerr, Bot. Gaz. **18**: 71. 1893.

Along springs and creeks, upward to the yellow pine belt. Michigan to Ohio, westward to Wyoming and eastern Utah.

79. MALVACEAE. Mallow Family

Annuals, perennials, or shrubs with alternate, mostly palmate-veined leaves; stipules small, deciduous; flowers mostly 5-merous, regular, perfect, dioecious, or polygamous; calyx more or less deeply cleft; petals hypogynous, convolute; stamens numerous, monadelphous; ovary several-celled, the ovules 1 to several in each cell; styles united below; fruit capsular, the carpels separating at maturity; seed with a curved embryo.

Style branches terminated by capitate stigmas; carpels dehiscent, the ovules 1 to several in each cell.

Plants annual, erect, spreading, or decumbent, mostly hispid. Leaves reniform, 1 to 3 cm. broad, long-petioled; flowers long-pedunculate. **5. EREMALCHE.**

Plants perennial.

Ovules ascending, 1 to 3 (seeds 1 or 2, sometimes 3) in each cell; carpels tomentulose to glabrate; flowers mostly in racemes or axillary ---- **4. SPHAERALCEA.**

Ovules and seeds pendulous, solitary in each cell; carpels rugose; flowers mostly solitary and axillary. Plants cespitose, with decumbent branches; leaves reniform, dentate, scurfy, canescent; corolla pale yellow or white ---- **6. SIDA.**

Style branches filiform, longitudinally stigmatose; carpels indehiscent, the ovules solitary.

Calyx without involucel; flowers in terminal racemes or spikes. Erect perennials; leaves palmately lobed or cleft ---- **3. SIDALCEA.**

Calyx with involucel; flowers solitary, in clusters or terminal racemes or spikes.

Petals emarginate; carpels beakless. Introduced plants. ---- **1. MALVA.**

Petals rounded at apex, purple, 2 to 3 cm. long; carpels beaked. Cespitose perennial, with thick root; leaves pedately dissected, sparingly hirsute, the ultimate lobes oblong; calyx deeply cleft ---- **2. CALLIRRHOE.**

1. MALVA L. Mallow

Corolla scarcely exceeding the calyx, lilac. Calyx accrescent in fruit; carpels glabrous or pubescent; erect, nearly glabrous annual with long-petioled, crenately lobed, reniform leaves ---- **1. M. parviflora.**

Corolla much exceeding the calyx, lilac, purplish, or white. Annuals.

Stems decumbent; leaves not crisp-margined, rounded-reniform, round-lobed, crenate; flowers mostly peduncled; carpels puberulent. **2. M. rotundifolia.**

Stems erect; leaves with crisped margin, reniform, lobed and doubly crenate; flowers mostly sessile; carpels nearly glabrous ---- **3. M. crispa.**

1. Malva parviflora L. Amoen. Acad. 3: 416. 1756.

Waste places; Arizona. Introduced from the Mediterranean region. Eastern States; Minnesota to Texas and California.

2. Malva rotundifolia L. Sp. Pl. 688. 1753.

Waste places; throughout the United States. Introduced from the Old World.

3. Malva crispa L. Syst. Veg. ed. 10. 1147. 1759.

Waste places; northwestern New Mexico. Introduced into the Eastern States; native of the Mediterranean region.

Malva moschata L. A sparingly hirsute perennial with suborbicular, incised or deeply parted leaves, and rose or white flowers is much cultivated. Escaped in the East and in the northwestern United States.

2. CALLIRRHOE Nutt. POPPYMALLOW

1. **Callirrhoe involucrata** (Torr. & Gray) A. Gray, Mem. Amer. Acad. n. ser. 4: 16. 1849.

Malva involucrata Torr. & Gray, Fl. N. Amer. 1: 226. 1838.

On plains. Minnesota to Texas, northeastern New Mexico, and Utah (?).

3. SIDALCEA St. Hil. PRAIRIEMALLOW

Corolla light yellow or whitish. Stem glabrous, 50 to 100 cm. high; calyx stellate-pubescent, the lobes ciliate; petals 15 to 20 mm. long; carpels several, smooth ..... 1. S. candida.

Corolla rose-colored or mauve-purple, rarely whitish.

Calyx stellate-pubescent or glandular, with long hairs intermixed. Carpels smooth; plants 30 to 100 cm. high; upper leaves parted into linear divisions, the lower crenately 5 to 9-lobed.

Lower pedicels equaling or exceeding the calyx; petals 12 to 18 mm. long. 5. S. neomexicana.

Lower pedicels much shorter than the calyx; petals about 12 mm. long.

Calyx lobes ovate, acuminate ..... 6. S. spicata.

Calyx with uniform pubescence, without long intermixed hairs.

Flowers in dense spikes ..... 6. S. spicata.

Flowers not in dense spikes.

Calyx 10 mm. long, deeply cleft, the lobes lanceolate, acuminate. Petals about 2 cm. long; plants somewhat cespitose, stellate-pubescent; leaves deeply 5 or 7-parted, the ultimate segments oblong to linear. 4. S. multifida.

Calyx rarely over 7 mm. long.

Lower leaves 2 to 5 cm. in diameter, the upper 5 or 7-parted into linear lobes; petals 10 to 15 mm. long; carpels glabrous, reticulate; plant glabrous up to the inflorescence. 3. S. glaucescens.

Lower leaves commonly over 6 cm. in diameter, cleft or nearly divided, the upper cleft or divided into cuneate or linear-lanceolate, entire or lobed segments; petals 15 to 20 mm. long; carpels somewhat reticulate; plant sparingly pubescent ..... 2. S. nervata.

1. **Sidalcea candida** A. Gray, Mem. Amer. Acad. n. ser. 4: 24. 1849.

Pinyon belt, upward to the subalpine belt. Wyoming and Utah to New Mexico.

2. **Sidalcea nervata** A. Nels. Proc. Biol. Soc. Washington 17: 94. 1904.

Meadows, canyons, and grassy slopes of the artemisia, pinyon, yellow pine, and aspen belts. Wyoming, Utah, and Idaho.

3. **Sidalcea glaucescens** Greene, Bull. Calif. Acad. 1: 77. 1885.

Meadows and hillsides of the artemisia, pinyon, and yellow pine belts. Oregon, California, and Nevada.

4. **Sidalcea multifida** Greene, Cybele Columb. 1: 34. 1914.

Yellow pine and aspen belts; Sierra Nevada. Western Nevada.

5. Sidalcea neomexicana A. Gray, Mem. Amer. Acad. n. ser. **4**: 23. 1849.
Sidalcea crenulata A. Nels. Proc. Biol. Soc. Washington **17**: 93. 1904.
Valleys and hillsides of the pinyon and yellow pine belts. Wyoming to New Mexcio, westward to Utah and southern California.

6. Sidalcea spicata (Regel) Greene, Bull. Calif. Acad. **1**: 76. 1885.
Callirrhoe spicata Regel, Gartenflora **21**: 291. *pl. 737, f. 3–4.* 1872.
Yellow pine and aspen belts; Sierra Nevada. Southern Oregon, California, and western Nevada.

4. SPHAERALCEA St. Hil. Globemallow

Leaves lanceolate or linear-lanceolate, crenulate, 4 to 10 cm. long. Flowers clustered, pediceled; petals 4 to 10 mm. long, pink; carpels rugose at base; plant 30 to 100 cm. high, with a woody base_____**1. S. cuspidata.**
Leaves broader.
Leaf blades divided or dissected to near the base. Upper leaves less divided or simple.
Primary divisions of the leaf entire, narrowly linear. Flowers few, copper-red; petals 1 cm. long; carpels small, tomentulose; plant with erect stems and silvery lepidote pubescence____**11. S. leptophylla.**
Primary divisions of the leaf lobed or divided, not entire (upper leaves excepted).
Plants green, glabrous or sparingly stellate-pubescent. Leaves small, the divisions obovate, with oblong or linear lobes; flowers in a narrow panicle; petals scarlet, 15 to 18 mm. long; carpels mucronate, reticulate below_____**7. S. rusbyi.**
Plants with grayish or silvery, stellate or lepidote pubescence. Petals 10 to 15 mm. long, brick-red to scarlet.
Inflorescence paniculate; upper half of mature carpels empty, the lower reticulate. Plants 20 to 60 cm. high; primary leaf divisions rhombic-cuneate, toothed or lobed__**8. S. grossulariaefolia.**
Inflorescence dense, raceme-like; empty portion of carpel very small.
Plants 10 to 30 cm. high; middle segment of the leaves slightly longer than the lateral; racemes dense_____**9. S. coccinea.**
Plants 30 to 40 cm. high; middle segment of the leaves elongate; racemes loose_____**10. S. elata.**
Leaf blades toothed or lobed, at the most cleft halfway to midrib.
Leaf blades with acute lobes, broadly cordate-ovate (maple-like), 5 or 7-lobed. Corolla rose-colored or white; plants 0.6 to 2 meters high, glabrous below; carpels hirsute, 2 or 3-seeded.
Petals 3 cm. long or more; plant hirsute with branched hairs above. **14. S. rydbergii.**
Petals 2 to 2.5 cm. long; plants sparingly stellate-pubescent to canescent above_____**13. S. rivularis.**
Leaf blades commonly with rounded teeth or lobes (the middle lobe often acute).
Plants 10 to 20 cm. high, densely whitish stellate-pubescent. Leaf blades rhombic-ovate, toothed above middle; calyx 10 mm. long or more, the red corolla twice longer; carpels 2-seeded. **2. S. caespitosa.**
Plants 30 cm. high or more, stellate-pubescent or tomentulose. Inflorescence thyrsoid.

Calyx 6 to 10 mm. long.
Corolla rose-colored, about 10 mm. long; carpels oval; leaf blades pentagonal or roundish, shallowly lobed, 2 to 8 cm. broad.
12. S. fremontii.
Corolla 15 mm. long or more, rose-colored or white; carpels cuspidate; leaf blades cordate-ovate, crenately toothed or 3 or 5-lobed.
3. S. ambigua.
Calyx 3 to 5 mm. long.
Leaf blades with cuneate base, rhombic-ovate, grayish green, lobed.
Corolla scarlet, 9 to 10 mm. long; carpels obtuse; seeds solitary.
6. S. subrhomboidea.
Leaf blades with cordate, truncate, or rounded base.
Leaf blades coarsely toothed, rounded-cordate, more or less 3 or 5-lobed; corolla rose-colored to scarlet, 10 mm. long; carpels acutish----------**4. S. munroana.**
Leaf blades closely crenate, reniform to rounded-ovate, commonly obscurely lobed; corolla pink, 10 to 12 mm. long; carpels cuspidate----------**5. S. marginata.**

1. Sphaeralcea cuspidata (A. Gray) Britton; Britt. & Brown, Illustr. Fl. 3: 519. 1898.
Sphaeralcea angustifolia cuspidata A. Gray, Proc. Amer. Acad. **22:** 293. 1887.
Plains and low hillsides of the Covillea and artemisia belts; Fort Mojave. Kansas to southern Nevada, southward to Texas and Mexico.

2. Sphaeralcea caespitosa Jones, Contr. West. Bot. **12:** 4. 1908.
Artemisia and pinyon belts. Western Utah.

3. Sphaeralcea ambigua A. Gray, Proc. Amer. Acad. **22:** 292. 1887.
Desert areas, and rocky canyons of the Covillea, artemisia and pinyon belts. Southern Utah and Arizona to southern California.

4. Sphaeralcea munroana (Dougl.) Spach; A. Gray. Proc. Amer. Acad. **22:** 292. 1887.
Malva munroana Dougl.; Lindl. Bot. Reg. **16:** *pl. 1306.* 1830.
Plains and dry hillsides of the upper Covillea, artemisia, and pinyon belts. British Columbia to Nevada and Utah.

5. Sphaeralcea marginata York, Bull. Torrey Club **33:** 145. 1906.
Sphaeralcea arizonica Heller, Bull. Torrey Club **40:** 59. 1913.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Colorado, Utah, New Mexico, and Arizona.

6. Sphaeralcea subrhomboidea Rydb. Bull. Torrey Club **40:** 59. 1913.
Valleys and canyons upward to the aspen belt. Utah.

7. Sphaeralcea rusbyi A. Gray, Proc. Amer. Acad. **22:** 293. 1887.
Dry hillsides of the pinyon and yellow pine belts. Arizona and southern Utah.

8. Sphaeralcea grossulariaefolia (Hook. & Arn.) Rydb. Bull. Torrey Club **40:** 58. 1913.
Sida grossulariaefolia Hook. & Arn. Bot. Beechey Voy. 326. 1841.
Plains and hillsides of the Covillea and artemisia belts. Wyoming and Idaho, southward to western Texas, Arizona, and Nevada.

9. Sphaeralcea coccinea (Pursh) Rydb. Bull. Torrey Club **40:** 58. 1913.
Cristaria coccinea Pursh, Fl. Amer. Sept. 453. 1814.
Sida dissecta Nutt.; Torr. & Gray, Fl. N. Amer. 1: 235. 1838.
Plains, valleys, and mountain sides, upward to the spruce belt. Manitoba to Oregon, southward to Iowa, Texas, and Arizona.

10. Sphaeralcea elata (Baker f.) Rydb. Bull. Torrey Club **40:** 58. 1913.
Malvastrum coccineum elatum Baker f. Journ. Bot. Brit. & For. **29:** 171. 1891.
Plains, canyons, and mountain sides of the Covillea, artemisia, and pinyon belts. Colorado to Arizona and western Texas.

11. Sphaeralcea leptophylla (A. Gray) Rydb. Bull. Torrey Club **40:** 59. 1913.
Malvastrum leptophyllum A. Gray, Pl. Wright **1:** 17. 1852.
Plains and dry hillsides of the Covillea and artemisia belts. Southern Colorado and Utah, southward to western Texas and Arizona.

12. Sphaeralcea fremontii (Torr.) Tidestrom.
Malvastrum fremontii Torr.; Gray, Mem. Amer. Acad. n. ser. **4:** 21. 1849.
Canyons and mountain sides of the artemisia belt. California and southwestern Nevada.

13. Sphaeralcea rivularis (Dougl.) Torr.; A. Gray, Mem. Amer. Acad. n. ser. **4:** 23. 1849.
Malva rivularis Dougl.; Hook. Fl. Bor. Amer. **1:** 107. 1830.
Sphaeralcea acerifolia Nutt.; Torr. & Gray, Fl. N. Amer. **1:** 228. 1838.
Along streams in canyons of the pinyon, yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to Colorado and Nevada.

14. Sphaeralcea rydbergii Tidestrom, nom. nov.
Sphaeralcea grandiflora Rydb. Bull. Torrey Club **31:** 565. 1904. Not *S. grandiflora* Phil. 1892.
Mesas, along streams and canyons of the pinyon, yellow pine, and aspen belts. Northern New Mexico, Colorado, and southeastern Utah.

5. EREMALCHE Greene

Plants spreading or decumbent, stellate-pubescent or hispid; leaves small, 5 or 7-lobed, the lobes laciniate; flowers white to violet-purple__1. **E. exilis.**
Plants erect, hirsute or hispid; leaves long-petioled, reniform to orbicular, coarsely crenate; flowers rose-purple with crimson blotch near base.
2. E. rotundifolia.

1. Eremalche exilis (A. Gray) Greene, Leaflets **1:** 208. 1906.
Malvastrum exile A. Gray in Ives, Rep. Colo. Riv. 8. 1860.
Desert areas and dry hillsides of the Covillea and artemisia belts. Southern Utah to southern California, southward to Mexico.

2. Eremalche rotundifolia (A. Gray) Greene, Leaflets **1:** 208. 1906.
Malvastrum rotundifolium A. Gray, Proc. Amer. Acad. **7:** 333. 1868.
Desert areas and dry canyons of the Covillea belt. California and southern Nevada.

6. SIDA L.

1. Sida hederacea (Dougl.) Torr.; A. Gray, Mem. Amer. Acad. n. ser. **4:** 23. 1849.
Malva hederacea Dougl.; Hook. Fl. Bor. Amer. **1:** 107. 1830.
Saline areas and dry plains of the Covillea and artemisia belts. Washington to western Texas and Mexico.

80. HYPERICACEAE. St.Johnswort Family

Annual or perennial herbs (our species); leaves simple, opposite or verticillate, estipulate, entire, glandular-punctate; flowers solitary or cymose-paniculate; petals hypogynous; stamens few to numerous, polyadelphous; styles as many as the carpels; ovary 1 to 7-celled; ovules numerous in each cell; fruit a many-seeded capsule.

1. HYPERICUM L. St.Johnswort

Plant procumbent, annual or perennial, often forming mats, the stems rooting at the nodes; leaves elliptic, 5 to 15 mm. long; petals slightly exceeding the (3 mm. long) sepals; black glands wanting----1. H. anagalloides.
Plants erect, perennial, 20 cm. high or more; leaves elliptic, obtuse, 10 to 25 mm. long; petals much exceeding the sepals, marked with marginal black dots.
Sepals obtuse or acutish----2. H. scouleri.
Sepals acuminate or nearly so----3. H. formosum.

1. Hypericum anagalloides Cham. & Schlecht. Linnaea 3: 127. 1828.

Wet meadows and canyons of the artemisia, yellow pine, and aspen belts. Idaho to British Columbia, southward to Lower California.

2. Hypericum scouleri Hook. Fl. Bor. Amer. 1: 111. 1830.

Meadows and moist ravines of the pinyon, yellow pine, aspen, and spruce belts. Montana and British Columbia, southward to Wyoming, Utah, and California.

3. Hypericum formosum H. B. K. Nov. Gen. & Sp. 5: 196. *pl. 460*. 1821.

Meadows and moist ravines of the pinyon, yellow pine, and aspen belts. Colorado to California, southward to Mexico.

81. ELATINACEAE. Waterwort Family

Low, creeping or erect herbs; leaves opposite or whorled; flowers regular, perfect, axillary and solitary or fascicled; sepals and petals 2 to 5; stamens as many or twice as many as the petals; styles 2 to 5; ovary 2 to 5-celled, with central placenta; ovules numerous; fruit a capsule; seed rugose or ribbed.

Plant glandular-pubescent, 10 to 30 cm. high, branching from base; leaves opposite, ovate-elliptic to oblong, glandular-toothed; flowers 5-merous, axillary; sepals scarious; petals oblong; capsule subglobose--1. BERGIA.
Plant glabrous, diffuse; stems 1 to 4 cm. long; leaves opposite or whorled; flowers solitary. axillary, 2 to 4-merous; petals rose-colored; capsule globose----2. ELATINE.

1. BERGIA L.

1. Bergia texana (Hook.) Seubert; Walp. Repert. Bot. 1: 285. 1842.

Merimea texana Hook. Icon. Pl. 3; *pl. 278*. 1840.

Wet low ground along rivers and ponds; western Nevada. Washington to California, Nevada, and Texas.

2. ELATINE L. Waterwort

1. Elatine americana (Pursh) Arnott, Edinburgh Journ. Scl. 1: 431. 1830.

Peplis americana Pursh, Fl. Amer. Sept. 238. 1814.

Margins of ponds and lakes; Washoe Lake. Quebec to British Columbia, southward to Virginia, New Mexico, California, and Mexico.

82. FRANKENIACEAE. Frankenia Family

Perennial herbs or undershrubs; leaves opposite or 4-nate, subsessile, entire, spatulate to linear, 1 cm. long or less, sparingly pubescent to glabrous (in our species); flowers regular, hypogynous, 4 or 5-merous; sepals united into a tube; petals mostly 5, purple, clawed, the claws united, the blades with basal crown; style 3 or 4-cleft; ovary 1-celled; placentae 2 to 4, parietal; fruit a capsule, included in the calyx.

1. FRANKENIA L.

1. Frankenia campestris (A. Gray) Tidestrom.

Frankenia grandifolia campestris A. Gray, Syn. Fl. 1¹: 209. 1895.

Saline areas within the Covillea belt. Southern Nevada and southeastern California.

83. TAMARICACEAE. Tamarix Family

Shrubs or small trees; leaves minute, scalelike, persistent; flowers in spikes or dense racemes, 4 or 5-merous; sepals free; petals free or united at base, white or rose-colored, inserted under a glandular disk; stamens 5 to 10, inserted on the disk; styles mostly 3 or 4; ovary 1-celled, the placentae basal; capsule 3 or 4-valved; seeds numerous.

1. TAMARIX L. TAMARIX

1. Tamarix gallica L. Sp. Pl. 270. 1753. FRENCH TAMARIX.

Introduced from Europe and planted extensively; escaped along Virgen River, near St. Thomas, Nevada. Mediterranean region to the Himalayas.

84. FOUQUIERIACEAE. Ocotillo Family

Spiny shrubs with erect virgate stems, 1 to 3 meters high; leaves (in our species) spatulate-oblanceolate, entire; flowers thyrsoid-paniculate, perfect, scarlet, appearing before the leaves, 5-merous; sepals free; corolla gamopetalous, broadly tubular, with spreading limb; stamens 10, epipetalous; styles 8, partly united; ovary 1-celled, with 3 septiform placentae; seeds winged or with a fringe of white hairs.

1. FOUQUIERIA H. B. K. OCOTILLO

1. Fouquieria splendens Engelm. in Wisliz. Mem. North. Mex. 98. 1848.

Mesas of the Covillea belt; Needles, California. Western Texas to southern Nevada (?), southeastern California, and Mexico.

85. VIOLACEAE. Violet Family

Annual or perennial herbs; leaves alternate, stipulate; flowers somewhat irregular, 5-merous, the lower petal gibbous or spurred at base; stamens 5, hypogynous, the adnate anthers connivent over the pistil; ovary of 3 carpels, 1-celled, the placentae parietal; style usually club-shaped; fruit a 1-celled capsule, many-seeded.

1. VIOLA L. VIOLET

Leaves pedately divided or bipinnatifid, the ultimate lobes oblong to linear.
  Flowers yellow and purple; stems short, erect, more or less clustered.
    Upper petal purple, the others yellow, purple-veined. Leaves glabrous or hirsute ..... 4. V. beckwithii.

Upper petal yellow or purple-brown outside. Leaves more or less pubescent.
Leaves 3-parted or divided, the divisions lobed or cleft; all petals yellow, purple-veined——5. V. sheltonii.
Leaves bipinnatifid; upper petal brown-purple outside——6. V. douglasii.
Leaves merely lobed, dentate, or crenate.
Plants acaulescent.
Flowers small, white, the petals purple-veined, nearly glabrous, the spur very short. Leaves ovate, reniform, or orbicular, exceeded by the slender peduncles——3. V. macloskeyi.
Flowers 1 cm. long or more, blue or violet, sometimes white.
Rootstock short, stout; leaves cordate-ovate to reniform, crenate, glabrous; plants not stoloniferous——1. V. nephrophylla.
Rootstock long, slender; leaves cordate-ovate to reniform or orbicular, crenate; plants stoloniferous, glabrous, 2 to 4 cm. high.
2. V. palustris.

Plants caulescent.
Flowers yellow. Stipules entire or laciniate; leaves more or less repand, dentate, or entire; stems erect, not stoloniferous.
Ovary and capsule mostly glabrous.
Leaves ovate to elliptic, abruptly tapering or with rounded or cordate base, obtuse, the blades 3 to 8 cm. long——9. V. linguaefolia.
Leaves lanceolate, tapering to base, acute or subacute, the blades 2 to 5 cm. long——10. V. nuttallii.
Ovary and capsule (sometimes the calyx) pubescent.
Petals 10 mm. long or more, yellow. Leaf blades 2 to 5 cm. long, more or less villous or hirsute, dentate or sinuate, with tapering or rounded base——11. V. aurea.
Petals smaller, yellow, with more or less purple or brown.
Leaf blades ovate to broadly cordate-ovate, 5 to 7-lobed or toothed, hirsutulous to glabrous (at least above), commonly purple-veined——7. V. purpurea.
Leaf blades oval to linear-lanceolate, coarsely to laciniately toothed, cinerous——8. V. pinetorum.
Flowers white, blue, or purple, not yellow.
Stipules entire, more or less scarious; petals with yellow base.
Plants tufted, depressed, 10 to 15 cm. high; leaves cordate-deltoid, acute, often scabrous above——12. V. scopulorum.
Plants with single or few stems, not usually erect, 15 to 35 cm. high, glabrous or nearly so; leaves broadly cordate-ovate, commonly acuminate——13. V. canadensis.
Stipules more or less toothed; petals violet or purple.
Spur short and thick, nearly as broad as long. Leaves reniform, glabrous——14. V. tidestromii.
Spur elongate, at least twice longer than broad.
Leaves conspicuously brown-dotted beneath, the blades cordate-ovate, obscurely crenate, glabrate or pubescent. Flowers 12 to 15 mm. long——15. V. adunca.
Leaves not brown-dotted beneath or only sparingly so, the blades cordate-ovate to oval.
Petioles and stems more or less densely retrorse-scabrous; sepals oblong-lanceolate, the spur straight——16. V. montanensis.
Petioles and stems glabrous or nearly so; sepals subulate-lanceolate, the spur curved——17. V. oxysepala.

1. Viola nephrophylla Greene, Pittonia **3**: 144. 1896.

Moist places in meadows, canyons, and mountain parks, upward to the spruce belt. Quebec to British Columbia, southward to New Mexico and California.

2. Viola palustris L. Sp. Pl. 934. 1753.

Aspen and spruce belts. Labrador to Alaska, southward to New England, Colorado, and Utah; also in Europe and Asia.

3. Viola macloskeyi Lloyd, Erythea **3**: 74. 1895.

Aspen and spruce belts. Alberta and British Columbia, southward to Colorado and California.

4. Viola beckwithii Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **2**: 119. *pl. 1.* 1855.

Valleys and foothills, upward to 1,800 meters. Utah to Oregon and California.

5. Viola sheltonii Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 67. *pl. 2.* 1857.

Spruce belt. Colorado to Washington and California.

6. Viola douglasii Steud. Nom. Bot. **2**: 771. 1841.

Valleys and grassy slopes, upward to 2,100 meters. Southern Oregon, California, and adjacent Nevada (?).

7. Viola purpurea Kellogg, Proc. Calif. Acad. **1**: 55. 1854.

Viola nuttallii venosa S. Wats. in King, Geol. Expl. 40th Par. **5**: 35. 1871.

Aspen and spruce belts. Utah to Washington and California.

8. Viola pinetorum Greene, Pittonia **2**: 14. 1889.

Hillsides and canyons, upward to 2,000 meters. Oregon and California, eastward to New Mexico.

9. Viola linguaefolia Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 141. 1838.

Moist places in canyons and on mountain sides, upward to the aspen belt. Montana to Colorado, Oregon, and California.

10. Viola nuttallii Pursh, Fl. Amer. Sept. 174. 1814.

Plains, foothills, and canyons, upward to the aspen belt. Manitoba to Montana, southward to Missouri and Arizona.

11. Viola aurea Kellogg, Proc. Calif. Acad. **2**: 185. *f. 54.* 1863.

Hillsides and canyons, upward to 1,800 meters. California and western Nevada.

12. Viola scopulorum (A. Gray) Greene, Pittonia **5**: 27. 1902.

Viola canadensis scopulorum A. Gray, Bot. Gaz. **11**: 291. 1886.

Spruce belt. Colorado, Utah, and Arizona.

13. Viola canadensis L. Sp. Pl. 936. 1753.

Aspen and spruce belts. New Brunswick to British Columbia, southward to New Mexico and Arizona.

14. Viola tidestromii Greene, Leaflets **2**: 34. 1910.

Aspen belt. Utah.

15. Viola adunca J. E. Smith, Rees's Cycl. **37**: no. 63. 1817.

Canyons and shaded slopes of the aspen and spruce belts. Alaska to California, Arizona, and Utah.

16. Viola montanensis Rydb. Mem. N. Y. Bot. Gard. **1**: 263. 1900.

Aspen and spruce belts. Montana to northern New Mexico.

17. Viola oxysepala Greene, Leaflets **2**: 34. 1910.

Aspen belt. Utah and Idaho.

86. LOASACEAE. Loasa Family

Annual, biennial, or perennial herbs, mostly with rough stinging pubescence; leaves estipulate, alternate or opposite, simple in our species; flowers solitary, racemose, or in cymes, 5-merous; calyx gamosepalous, the tube adnate to the ovary; petals 4 or 5; stamens numerous, the outer often petal-like, in clusters and opposite the petals; ovary mostly 1-celled, with 2 or 3 parietal placenate; seeds numerous, prismatic, angled, or winged.

Stamens 5, the filaments filiform. Sepals linear, deciduous; petals yellowish white, spatulate; style 1; capsule ovate or oblong; scabrous shrubs or shrubby perennials----------1. **PETALONYX.**

Stamens 10 to 100 or more, the filaments filiform or dilated. Annuals or perennials; styles often united.

Styles and placentae 3, the latter with or without horizontal lamellae.
2. MENTZELIA.

Styles and placentae 5. Hispid biennial, 20 to 30 cm. high. Leaves broadly ovate, 4 to 5 cm. long, coarsely toothed; flowers solitary or cymose, distinctly pediceled; petals light yellow, 3 to 4 cm. long; capsule oblong.
3. EUCNIDE.

1. PETALONYX A. Gray

Leaves sessile, ovate-acuminate to lanceolate, 6 to 20 mm. long. Petals spatulate, long-clawed, about 5 mm. long; capsule ovate, 2 to 3 mm. long, densely pilose; seeds smooth, subterete----------**1. P. thurberi.**

Leaves short-petioled.

Inflorescence racemose; petals 9 to 10 mm. long; shrub; leaves ovate, denticulate to subentire, reduced above----------**2. P. parryi.**

Inflorescence paniculate; petals 6 to 7 mm. long; shrubby perennial; leaves ovate or rhombic, crenate or dentate, reduced above------**3. P. nitidus.**

1. Petalonyx thurberi A. Gray, Mem. Amer. Acad. n. ser. 5: 319. 1854.

Sandy plains and hillsides of the Covillea and artemisia belts. Southern Utah to southern California, southward to Mexico.

2. Petalonyx parryi A. Gray, Proc. Amer. Acad. 10: 72. 1874.

Desert areas and canyons of the Covillea belt. Southern Utah and Nevada.

3. Petalonyx nitidus S. Wats. Amer. Nat. 7: 300. 1873.

Rocky canyons and mountain sides of the Covillea belt. California and southwestern Nevada.

2. MENTZELIA L. BLAZING-STAR

Filaments dilated and 3-cuspidate, the middle tooth anther-bearing. Calyx tube cylindric or nearly so; capsule cylindric; seeds numerous, not winged; scabrous annuals, 4 to 24 cm. high; flowers light yellow. (BICUSPIDARIA.)

Leaves petioled, linear-lanceolate to ovate-lanceolate, subentire to deeply sinuate-dentate; floral bracts lanceolate or broader, lax, sinuate-dentate or pinnatifid----------**1. M. tricuspis.**

Leaves (at least the upper) sessile, lanceolate to triangular-ovate, with cordate base; floral bracts ovate or ovate-orbicular, contiguous, irregularly dentate----------**2. M. involucrata.**

Filaments dilated or filiform, not 3-toothed at apex. Leaves sessile or short-petioled; annuals, biennials, or perennials.

Calyx lobes 2.5 to 4 cm. long. Petals spatulate to oblanceolate, 4 to 7 cm. long; capsule 4 to 5 cm. long; robust biennials or perennials, 1 meter high or less.

Petal-like staminodia 5. Floral bracts pinnatifid; leaves oblanceolate to lanceolate, pinnatifid; plant scabrous----------10. **M. decapetala.**
Petal-like staminodia none.
Stem glabrous; leaves oblanceolate to ovate-lanceolate above, sinuate-dentate, scabrous; petals narrowly oblanceolate--11. **M. laevicaulis.**
Stem scabro-pubescent; leaves linear-oblanceolate to triangular-lanceolate above, sinuate-dentate, scabrous; petals oblanceolate.
12. M. acuminata.
Calyx lobes 2 to 10 mm. long.
Petal-like staminodia none. Stamens 10 or more, the filaments filiform; petals 2 to 20 mm. long.
Bracts 3-lobed, membranous below; inflorescence compact. Plant pilose; leaves linear and entire to lanceolate and coarsely toothed; capsule clavate, about 8 mm. long----------13. **M. congesta.**
Bracts neither 3-lobed nor membranous; inflorescence more or less open.
Calyx lobes 4 to 6 mm. long.
Plant annual (?), 30 to 50 cm. high; leaves pubescent, linear to lanceolate, with broad base, entire to pinnatifid; petals obovate, 6 to 8 mm. long----------14. **M. ctenophora.**
Plant perennial, 7 to 15 cm. high, cespitose and densely hispid; leaves oblong, pinnatifid, with 1 to 3 pairs of acute lobes; flowers solitary, axillary; petals oblanceolate, 10 mm. long. Capsule ovate, contracted below the summit----15. **M. torreyi.**
Calyx lobes 1 to 3 mm. long. Petals obovate; annuals.
Leaves linear-oblong to ovate. Petals 3 to 4 mm. long; capsule 2 to 3 cm. long----------18. **M. dispersa.**
Leaves linear to linear-oblanceolate, entire or pinnatifid.
Petals 3 to 4 mm. long; capsule 10 to 15 mm. long.
16. M. albicaulis.
Petals 6 to 8 mm. long; capsule about 15 mm. long.
17. M. gracilenta.
Petal-like staminodia present. Petals 1 to 2 cm. long; leaves toothed, lobed, or pinnatifid.
Petals obtuse.
Petals oblanceolate, 10 to 15 mm. long. Capsule 10 mm. long; stem scabrous, 10 to 30 cm. high; leaves spatulate, 2.5 to 3 cm. long, sinuate-dentate, with obtuse teeth----------5. **M. pterosperma.**
Petals spatulate, 10 to 20 mm. long. Stems 30 to 60 cm. high.
Stems softly white-pubescent; leaves linear-oblong to cordate and clasping above, sinuate-dentate to nearly entire; petals broadly spatulate, retuse, pubescent; capsule 8 to 10 mm. long and nearly as broad----------3. **M. leucophylla.**
Stems glabrous or scabro-puberulent; leaves linear-lanceolate to lance-obovate, mostly pinnatifid; petals rounded; capsule 15 to 20 mm. long----------4. **M. multiflora.**
Petals acute.
Leaves mostly entire, oblanceolate to ovate-lanceolate above. Pubescent biennial, 20 to 30 cm. high; petals 15 to 18 mm. long; capsule 12 to 15 mm. long----------6. **M. integra.**
Leaves prevailingly toothed or pinnatifid.
Plant stout, scabrous, biennial, 1 meter high or more. Leaves long-lanceolate, sinuate-dentate; petals oblanceolate, 15 to 20 mm. long; capsule 3 cm. long----------9. **M. rusbyi.**

Plants low, puberulent, biennial or perennial, 20 to 40 cm. high.
Plant simple below; petals 10 to 12 mm. long; capsule about 10 mm. long ..... 7. M. pumila.
Plant branching from base; petals and capsule about 15 mm. long. 8. M. densa.

1. Mentzelia tricuspis A. Gray, Amer. Nat. **9**: 271. 1875.
Desert areas, dry hillsides, and canyons of the Covillea belt. Arizona, southern Nevada, and southern California.

2. Mentzelia involucrata S. Wats. Proc. Amer. Acad. **20**: 367. 1885.
Desert areas and dry hillsides of the Covillea belt; Needles, California. Arizona and southern California.

3. Mentzelia leucophylla T. S. Brandeg. Bot. Gaz. **27**: 448. 1899.
Covillea belt; Ash Meadows, Nevada.

4. Mentzelia multiflora (Nutt.) A. Gray, Mem. Amer. Acad. n. ser. **4**: 48. 1849.
Bartonia multiflora Nutt. Journ. Acad Phila. II. **1**: 180. 1848.
Nuttallia lobata Rydb. Bull. Torrey Club **40**: 61. 1913.
Sandhills and canyons of the Covillea belt, upward to the yellow pine belt. Colorado and Utah, southward to Texas and Mexico.

5. Mentzelia pterosperma Eastw. Proc. Calif. Acad. II. **6**: 290. 1896.
Sandy valleys of the artemisia belt; eastern Utah. Colorado and Utah.

6. Mentzelia integra (Jones) Tidestrom.
Mentzelia multiflora integra Jones, Proc. Calif. Acad. II. **5**: 689. 1895.
Canyons and dry hillsides of the Covillea and artemisia belts. Southern Utah, northern Arizona, and New Mexico.

7. Mentzelia pumila (Nutt.) Torr. & Gray, Fl. N. Amer. **1**: 535. 1840.
Bartonia pumila Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 535. 1840, as synonym.
Hillsides and sandy flats of the artemisia belt. Wyoming, Colorado, and Utah.

8. Mentzelia densa Greene, Pittonia **3**: 99. 1896.
Canyons, hillsides, and plateaus of the pinyon and yellow pine belts. Colorado, Utah, and New Mexico.

9. Mentzelia rusbyi Wooton, Bull. Torrey Club **25**: 261. 1898.
Canyons and plateaus of the artemisia, pinyon, and yellow pine belts. Wyoming to New Mexico and Arizona.

10. Mentzelia decapetala (Pursh) Urb. & Gilg in Engl. & Prantl, Pflanzenfam. 3^{6a}: 111. 1894.
Bartonia decapetala Pursh in Curtis's Bot. Mag. **18**: *pl. 1487*. 1812.
Plains and hillsides of the artemisia and pinyon belts. Alberta to South Dakota, Texas, and Nevada.

11. Mentzelia laevicaulis (Dougl.) Torr. & Gray, Fl. N. Amer. **1**: 535. 1840.
Bartonia laevicaulis Dougl.; Hook. Fl. Bor. Amer. **1**: 221. 1834.
Artemisia, pinyon, and yellow pine belts. Washington and Idaho, southward to California and Utah.

12. Mentzelia acuminata (Rydb.) Tidestrom.
Nuttallia acuminata Rydb. Bull. Torrey Club **40**: 61. 1913.
Canyons and mountain sides of the artemisia, pinyon, and yellow pine belts. Montana to Washington, southward to Utah and Nevada.

13. Mentzelia congesta (Nutt.) Torr. & Gray, Fl. N. Amer. 1: 534. 1840.

Trachyphytum congestum Nutt.; Torr. & Gray, Fl. N. Amer. 1: 534. 1840, as synonym.

Plains and mountains sides of the artemisia and pinyon belts. California, Nevada, and Idaho.

14. Mentzelia ctenophora Rydb. Bull. Torrey Club 28: 33. 1901.

Acrolasia gracilis Rydb. Bull. Torrey Club 31: 566. 1904.

Mentzelia polita A. Nels. Bot. Gaz. 47: 427. 1909.

Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Montana and British Columbia, southward to New Mexico and Arizona.

15. Mentzelia torreyi A. Gray, Proc. Amer. Acad. 10: 72. 1874.

Plains and valleys of the artemisia belt. California and Nevada.

16. Mentzelia albicaulis Dougl.; Hook. Fl. Bor. Amer. 1: 222. 1834.

Mentzelia pinetorum Heller, Bull. South. Calif. Acad. 2: 69. 1903.

Plains and mountain sides of the Covillea belt, upward to the yellow pine belt. Montana and British Columbia, southward to New Mexico and California.

17. Mentzelia gracilenta Torr. & Gray, Fl. N. Amer. 1: 534. 1840.

Mentzelia veatchiana Kellogg, Proc. Calif. Acad. 2: 99. *f.* 28. 1863.

Plains and hillsides of the artemisia belt. Oregon, Nevada, and California.

18. Mentzelia dispersa S. Wats. Proc. Amer. Acad. 11: 137. 1876.

Mentzelia albicaulis integrifolia S. Wats. in King, Geol. Expl. 40th Par. 5: 114. 1871.

Covillea belt, upward to the yellow pine belt. Montana and British Columbia, southward to Mexico.

3. EUCNIDE Zucc.

1. Eucnide urens Parry, Amer. Nat. 9: 144. 1875.

Mentzelia synandra A. Nels. Bot. Gaz. 47: 428. 1909.

Crevices of rocks in canyons and on slopes of the Covillea belt. Southern Utah and Nevada, Arizona, and southern California.

87. CACTACEAE. Cactus Family

(Contributed by J. N. Rose)

Succulent shrubby plants, mostly spiny; spines solitary or in clusters, arising from bristly or hairy cushions (areolae); leaves bractlike and deciduous or wanting; flowers regular and solitary (in our species), perfect; sepals and petals numerous, in several rows, the bases adherent to the 1-celled ovary; stamens numerous, inserted on the tube formed by the union of the sepals and petals; ovary inferior; style 1; stigmas numerous; fruit a berry.

Internodes (joints) flat. Leaves bractlike, caducous; calyx tube very short. **9. OPUNTIA.**

Internodes (or plant body) not flat.

Spines sheathed ..... **9. OPUNTIA.**

Spines not sheathed. Leaves wanting.

Spine-bearing areolae arranged on definite straight ribs; plant body globose to oblong or cylindric.

Flowers appearing lateral, borne immediately above the old spine-bearing areolae; ovary scaly and spiny, the spines deciduous; fruit fleshy ..... **1. ECHINOCEREUS.**

Flowers subterminal, borne above the young spine-bearing areolae; ovary scaly but not spiny; fruit fleshy or dry.
Scales on ovary and flower tube more or less woolly in their axils.
Scales on ovary and flower tube numerous, long-woolly in their axils——2. ECHINOCACTUS.
Scales on ovary and flower tube few, with small tufts of felt in their axils——3. SCLEROCACTUS.
Scales on ovary and flower tube naked.
Scales on ovary and flower tube entire. Spines 4 cm. long or less. 4. FEROCACTUS.
Scales on the ovary and flower tube fimbriate——5. UTAHIA.
Spine-bearing areolae more or less scattered or disposed in spiral rows; plant body globose or oval. Ovary and fruit smooth.
Flowers borne near the spine-bearing areolae, 2 cm. long or less, yellowish green to purple. Fruit green, globose; plant subglobose to turbinate, 8 to 13 cm. in diameter; spines numerous, 8 to 14 mm. long——6. PEDIOCACTUS.
Flowers borne at base of the tubercles of the stem.
Tubercles grooved above; flowers subcentral——7. CORYPHANTHA.
Tubercles not grooved; flowers lateral——8. PHELLOSPERMA.

1. ECHINOCEREUS Engelm.

Central spines solitary.
Central spine terete; radial spines 5 to 10, 12 to 25 mm. long; flowers deep purple, 10 cm. broad or less; ovary with white bristly spines; fruit ovoid, purplish, edible; stems with 9 to 12 ribs——3. E. fendleri.
Central spine angular; radial spines 5 to 8, 2 to 5 cm. long; flowers crimson, 5 to 7 cm. long; ovary with short acicular spines; fruit oblong, 3 cm. long or less; stems with 8 to 12 ribs——4. E. mojavensis.
Central spines 2 to 7.
Internodes 3 to 5 cm. in diameter, 20 cm. long or less; ribs 8 to 11; central spines white to yellowish, straight; flowers crimson, 5 to 7 cm. long; ovary with short bristly spines; fruit globular, spiny——1. E. coccineus.
Internodes 5 to 6 cm. in diameter, 10 to 30 cm. long; ribs 11 to 13; central spines more or less variegated, curved or twisted; flowers purple, 5 to 8 cm. long; ovary with stout bristles; fruit ovoid to oblong, spiny. 2. E. engelmannii.

1. **Echinocereus coccineus** Engelm. in Wisliz. Mem. North. Mex. 93. 1848.
Rocky slopes and canyons of the artemisia and pinyon belts. Colorado, Utah, New Mexico, and Arizona.

2. **Echinocereus engelmannii** (Parry) Rümpl. in Först. Handb. Cact. ed. 2. 805. 1885.
Cereus engelmannii Parry, Amer. Journ. Sci. II. 14: 338. 1852.
Rocky slopes of the Covillea belt. Southern Utah to southern California, southward to Mexico.

3. **Echinocereus fendleri** (Engelm.) Rümpl. in Först. Handb. Cact. ed. 2. 801. 1885.
Cereus fendleri Engelm. in A. Gray, Mem. Amer. Acad. n. ser. 4: 51. 1849.
Plains of the Covillea belt. Texas to Utah, southward to Mexico.

4. **Echinocereus mojavensis** (Engelm.) Rümpl. in Först. Handb. Cact. ed. 2. 803. 1885.

Cereus mojavensis Engelm. Proc. Amer. Acad. 3: 281. 1856.

Canyons and plains of the Covillea and artemisia belts. Southern Utah to southern California, southward to Mexico.

2. ECHINOCACTUS Link & Otto

1. **Echinocactus xeranthemoides** Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 358. 1896.

Desert areas and dry hillsides of the Covillea belt. Southern Utah and Arizona.

3. SCLEROCACTUS Britt. & Rose

Plant body globose or oblong, 7.5 to 15 cm. high; flowers rose-colored or purplish, 3 to 4 cm. long; style pubescent; fruit oblong, 1.5 cm. long, nearly naked ..... 1. S. whipplei.

Plant body globular to oblong, 10 to 40 cm. high; flowers magenta, 7 to 8 cm. long; style glabrous; fruit oblong to pyriform, 3.5 to 4 cm. long, nearly naked ..... 2. S. polyancistrus.

1. **Sclerocactus whipplei** (Engelm. & Bigel.) Britt. & Rose, Cactaceae 3: 213. *pl. 16*. 1922.

Echinocactus whipplei Engelm. & Bigel. U. S. Rep. Expl. Miss. Pacif. 4: 29. 1857.

Sandy plains and dry hillsides of the artemisia belt. Southwestern Colorado, southern Utah, and Arizona.

2. **Sclerocactus polyancistrus** (Engelm. & Bigel.) Britt. & Rose, Cactaceae 3: 213. *pl. 23*. 1922.

Echinocactus polyancistrus Engelm. & Bigel. Proc. Amer. Acad. 3: 272. 1856.

Covillea and artemisia belts; Goldfield, Nevada. Nevada and California.

4. FEROCACTUS Britt. & Rose

Spines not hooked, the central recurved, 4 cm. long or less; stems oval, 10 to 20 cm. long; ribs 17 to 21; flowers red to pink ..... 1. F. johnsonii.

Spines partly hooked; stems stout, globose to cylindric, 50 to 120 cm. high; ribs 21 or more, compressed; flowers yellow. Fruit ovate, scaly. 2. F. lecontei.

1. **Ferocactus johnsonii** (Parry) Britt. & Rose, Cactaceae 3: 141. 1922.

BEEHIVE CACTUS.

Echinocactus johnsonii Parry; Engelm. in King, Geol. Expl. 40th Par. 5: 117. 1871.

Desert areas, canyons, and dry hillsides of the Covillea and artemisia belts. Southern Utah and Arizona.

2. **Ferocactus lecontei** (Engelm.) Britt. & Rose, Cactaceae 3: 141. 1922.

Echinocactus lecontei Engelm. U. S. Rep. Expl. Miss. Pacif. 4: 31. 1857.

Valleys and mountain sides of the Covillea and artemisia belts. Southwestern Utah to southern California and Arizona.

5. UTAHIA Britt. & Rose

1. **Utahia sileri** (Engelm.) Britt. & Rose, Cactaceae 3: 215. *f. 225*. 1922.

Echinocactus sileri Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 376. 1896.

Artemisia belt. Southern Utah.

6. PEDIOCACTUS Britt. & Rose

1. Pediocactus simpsonii (Engelm.) Britt. & Rose; Britt. & Brown, Illustr. Fl. ed. 2. **2**: 570. 1913.

Echinocactus simpsoni Engelm. Trans. Acad. St. Louis. **2**: 197. 1863.

Plains and hillsides of the artemisia belt. Kansas to Wyoming, Nevada, and Mexico.

7. CORYPHANTHA Lem.

Central spines 4 or 5; radials 12 to 40; stem ovate to cylindric, 5 to 13 cm. high; flowers violet to dark purple, 3.5 to 5.5 cm. long____**1. C. arizonica.**

Central spines 8 to 14; radials 12 to 40 or more; stem subglobose to cylindric, 5 to 27 cm. high; flowers greenish yellow, 2.5 to 3.5 cm. long.
2. C. chlorantha.

1. Coryphantha arizonica (Engelm.) Britt. & Rose, Cactaceae **4**: 45. 1923.

Mammillaria arizonica Engelm. Bot. Calif. **1**: 124. 1876.

Plains and hillsides of the Covillea belt. Arizona and southern Utah.

2. Coryphantha chlorantha (Engelm.) Britt. & Rose, Cactaceae **4**: 43 *f. 42*. 1923.

Mammillaria chlorantha Engelm. in Wheeler, Rep. U. S. Surv. 100th Merid. 127. 1878.

Covillea belt. Southern Utah to southern California, southward to Mexico.

8. PHELLOSPERMA Britt. & Rose

1. Phellosperma tetrancistra (Engelm.) Britt. & Rose, Cactaceae **4**: 60. *f. 57, 58*. 1923.

Mammillaria tetrancistra Engelm. Amer. Journ. Sci. II. **14**: 337. 1852.

Mammillaria phellosperma Engelm. Proc. Amer. Acad. **3**: 262. 1856.

Covillea belt. Southern Utah, Nevada, and Arizona.

9. OPUNTIA Mill. PRICKLYPEAR

Internodes (joints) flattened, orbicular, obovate, or elliptic, several times as wide as thick. Spines without papery sheaths.

Plants erect, 2 meters high or more. Internodes ovate to orbicular, 15 to 20 cm. long; areolae with several yellow, appressed and reflexed spines; flowers yellow, 6 to 7.5 cm. broad; fruit purple, 4 cm. long.
10. O. chlorotica.

Plants prostrate or low (rarely tall).

Spines none or rarely a few at the upper areolae. Internodes broadly obovate, 8 to 20 cm. long; areolae white-bristly or brownish-woolly; flowers deep purple (rarely white), 6 to 8 cm. long; fruit dry.
8. O. basilaris.

Spines present, more or less numerous.

Internodes turgid (some of them subterete or globose), obovate, 1 to 4 cm. long. Areolae white-woolly and with brown-tipped spines; flowers pale yellow, 5 cm. broad; fruit dry, spiny, 1.5 to 2 cm. long_____**11. O. fragilis.**

Internodes flat and thin.

Spines slender, long and flexible.

Areolae each with 2 or 3 spines and numerous bristles, densely white-woolly; internodes ovate, 12 to 15 cm. long.
9. O. rubrifolia.

Areolae with numerous white or brownish spines; internodes ovate to oblong, 8 to 12 cm. long. Flowers red or yellow, 6 to 7 cm. long; fruit spiny----------12. O. erinacea.

Spines stiff, acicular or subulate. Areolae distant.

Areolae usually less than 10 mm. apart, all spiny. Internodes orbicular, 10 cm. broad or less; flowers yellow, 4 to 5 cm. long; fruit oblong, dry; spines 3 cm. long or less, white or brown. 15. O. polyacantha.

Areolae usually over 10 mm. apart, the lower often spineless.

Spines numerous, pale brown to white, 10 cm. long or less; internodes obovate to orbicular, 8 to 20 cm. long; flowers yellow; fruit oblong or obovoid, dry, spiny above--13. O. hystricina.

Spines 5 to 7, 3 cm. long or less, brownish; internodes obovate or oblong, 5 to 12 cm. long; flowers red to salmon-colored; fruit spiny----------14. O. rhodantha.

Internodes terete to globose. Spines with papery sheaths (except in nos. 6, 7, and 11).

Internodes partly flattened, obovate, others terete, 1 to 4 cm. long.

Plants forming low dense mounds----------11. O. fragilis.

Internodes all terete to globose.

Plants frutescent, branching, 1 to 2 meters high.

Tubercles nearly flat, diamond-shaped. Spines, when present, usually one at an areole; internodes slender, terete; flowers greenish yellow, tinged with red, 3 to 4 cm. long; fruit dry, covered with slender spines----------1. O. ramosissima.

Tubercles neither flat, nor diamond-shaped.

Tubercles 2 to 3 times as long as wide. Spines acicular, 2 to 3 cm. long; terminal internode 4 to 8 cm. long; flowers red to yellow, 5 cm. long; fruit dry, naked below, spiny-tuberculate above----------3. O. acanthocarpa.

Tubercles less than twice as long as wide.

Spines acicular, not forming an impenetrable armament; internodes short; flowers yellow, often tipped with red; fruit dry, very spiny----------4. O. echinocarpa.

Spines slender, very numerous, forming an impenetrable armament; internodes 5 to 15 cm. long; flowers cream to pale magenta; fruit fleshy, strongly tuberculate. 5. O. bigelovii.

Plants low, bushy.

Spines very numerous, forming an impenetrable armament. 5. O. bigelovii.

Spines not forming an impenetrable armament.

Spines with papery sheaths. Flowers small, yellow; fruit tuberculate, spineless----------2. O. whipplei.

Spines without papery sheaths. Glochids numerous.

Internodes broadly clavate; spines flattened; fruit 5 cm. long. 6. O. parishii.

Internodes narrowly clavate; spines terete or nearly so; flowers purple (with the ovary), 5 cm. long; fruit 2.5 cm. long----------7. O. pulchella.

1. Opuntia ramosissima Engelm. Amer. Journ. Sci. II. 14: 339. 1852.

Plains and hillsides of the Covillea belt. Southern Nevada, western Arizona, and southern California.

2. Opuntia whipplei Engelm. & Bigel. Proc. Amer. Acad. **3**: 307. 1856.

Plains and hillsides of the Covillea belt, upward to the yellow pine belt. Southwestern Colorado and northern New Mexico to southern and Lower California.

3. Opuntia acanthocarpa Engelm. & Bigel. Proc. Amer. Acad. **3**: 308. 1856.

Plains and hillsides of the Covillea and artemisia belts. Southern Utah to California, southward to Mexico.

4. Opuntia echinocarpa Engelm. & Bigel. Proc. Amer. Acad. **3**: 305. 1856.

Plains and hillsides of the Covillea belt. Utah to California, Arizona, and Lower California.

5. Opuntia bigelovii Engelm. Proc. Amer. Acad. **3**: 307. 1856.

Plains and hillsides of the Covillea belt. Southern Nevada and California, southward to Mexico.

6. Opuntia parishii Orcutt, West Amer. Sci. **10**: 81. 1896.

Plains and hillsides of the Covillea belt. Southern Nevada and southern California.

7. Opuntia pulchella Engelm. Trans. Acad. St. Louis **2**: 201. 1863.

Desert areas and hillsides of the artemisia belt. Nevada and Arizona.

8. Opuntia basilaris Engelm. & Bigel. Proc. Amer. Acad. **3**: 298. 1856.

Desert areas and hillsides of the Covillea and artemisia belts. Southern Utah to southern California, southward to Mexico.

9. Opuntia rubrifolia Engelm. in Coulter, Contr. U. S. Nat. Herb. **3**: 424. 1896.

Hillsides of the Covillea belt; St. George, Utah.

10. Opuntia chlorotica Engelm. & Bigel. Proc. Amer. Acad. **3**: 291. 1856.

Canyons and mountain sides of the artemisia and pinyon belts. New Mexico to southern California, southward to Mexico.

11. Opuntia fragilis (Nutt.) Haw. Suppl. Pl. Succ. 82. 1819.

Cactus fragilis Nutt. Gen. Pl. **1**: 269. 1818.

Plains and hillsides of the artemisia belt. Wisconsin to British Columbia, southward to Texas and Oregon.

12. Opuntia erinacea Engelm. Proc. Amer. Acad. **3**: 301. 1856.

Plains and hillsides of the Covillea, artemisia, and pinyon belts. Southern Utah, Nevada, and Arizona.

13. Opuntia hystricina Engelm. & Bigel. Proc. Amer. Acad. **3**: 299. 1856.

Canyons and mountain sides of the artemisia and pinyon belts. New Mexico to Arizona and Nevada.

14. Opuntia rhodantha Schum. Gartenwelt **1**: 90. 1896.

Opuntia utahensis Purpus, Monatsschr. Kakteenk. **19**: 133. 1909.

Plains, canyons, and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Western Nebraska to Colorado and Utah.

15. Opuntia polyacantha Haw. Suppl. Pl. Succ. 82. 1819.

Plains and canyons, upward to the pinyon belt. Alberta to Washington, southward to Texas and Arizona.

88. ELAEAGNACEAE. Oleaster Family

Shrubs or trees; leaves entire, opposite or alternate, lepidote or stellate-pubescent; flowers perfect, polygamous, or dioecious, in axillary clusters;

calyx commonly 4-lobed; petals none; stamens 4 or 8, inserted in the throat of the calyx; ovary 1-celled, 1-ovuled; style slender, stigmatose on one side; fruit drupelike.

Leaves opposite; flowers dioecious ..... 1. LEPARGYREA.
Leaves alternate, silvery-scurfy on both faces, 2 to 10 cm. long; flowers perfect. 2. ELAEAGNUS.

1. LEPARGYREA Raf. BUFFALOBERRY.

Leaves oblong, 2 to 5 cm. long, silvery on both sides. Fruit ellipsoid, red or yellow, 4 to 6 mm. long, sour; thorny shrub ..... 3. L. argentea.
Leaves ovate or oval.
  Leaves green above, brown-scurfy beneath, 1 to 5 cm. long; fruit red or yellowish, ellipsoid, insipid ..... 1. L. canadensis.
  Leaves silvery olive-gray above, densely white stellate-pubescent beneath; fruit globose, scurfy ..... 2. L. rotundifolia.

1. Lepargyrea canadensis (L.) Greene, Pittonia 2: 122. 1890.

Hippophae canadensis L. Sp. Pl. 1024. 1753. RUSSET BUFFALOBERRY.

Pinyon belt, upward to the subalpine belt. Newfoundland to Alaska, southward to New York, New Mexico, and Oregon.

2. Lepargyrea rotundifolia (Parry) Greene, Pittonia 2: 122. 1890.

Shepherdia rotundifolia Parry, Amer. Nat. 9: 350. 1875.

Canyons and mountain sides of the artemisia and pinyon belts. Southern Utah and Arizona.

3. Lepargyrea argentea (Pursh) Greene, Pittonia 2: 122. 1890.

SILVER BUFFALOBERRY.

Hippophae argentea Pursh, Fl. Amer. Sept. 115. 1814.

Plains and canyons of the artemisia and pinyon belts. Saskatchewan and Alberta, southward to Kansas, New Mexico, and Nevada.

2. ELAEAGNUS L.

Leaves oblong to elliptic or ovate; fruit ellipsoid, silvery, 8 to 12 mm. long. 1. E. commutata.
Leaves oblong to linear-oblong; fruit oval, yellow, 25 mm. long or less, more or less silvery-scurfy ..... 2. E. angustifolia.

1. Elaeagnus commutata Bernh. "Allg. Thuer. Gartenz. 2: 137. 1843."

SILVERBERRY.

Elaeagnus argentea Pursh, Fl. Amer. Sept. 114. 1814. Not *E. argentea* Moench, 1794.

Plains, canyons, and mountain sides of the artemisia and pinyon belts. Quebec to British Columbia, southward to Minnesota, Colorado, and northern Utah.

2. Elaeagnus angustifolia L. Sp. Pl. 121. 1753. RUSSIAN-OLIVE.

Escaped from cultivation and established along canals; Nevada. Mediterranean region.

89. LYTHRACEAE. Loosestrife Family

Annual glabrous marsh herbs (our species) with 4-angled stems and branches; leaves mostly opposite, entire; inflorescence cymose, paniculate, or axillary; flowers mostly regular; calyx of free sepals, toothed or lobed, the sinuses appendaged; petals present or wanting, of the same number as the

calyx lobes; stamens 4 to 12, inserted on the calyx tube; style filiform or obsolete, the stigma capitate; ovary 2 to 6-celled; ovules numerous, on a central placenta; fruit a capsule.

Calyx tube cylindric, many-ribbed, the teeth short. Petals 4 to 6; capsule 2-celled, bursting irregularly; perennial, 30 cm. high or more; leaves glabrous, lanceolate to linear----------**4. LYTHRUM.**

Calyx tube campanulate or hemispheric.

Leaves stalked, linear-oblong, 1 cm. long or more. Calyx small, 4-lobed; petals minute; style short; capsule globose, septicidally dehiscent. **2. ROTALA.**

Leaves sessile.

Plants small, aquatic; leaves thin, lanceolate to linear, acute; petals none; style minute; capsule 2-celled, indehiscent----------**1. DIDIPLIS.**

Plants erect, glabrous, annual, 15 cm. high or more; leaves auriculate, linear-lanceolate, 5 cm. long or more; petals purple; style slender; capsule 2 to 4-celled, dehiscing irregularly----------**3. AMMANNIA.**

1. DIDIPLIS Raf. WATER-PURSLANE

1. **Didiplis diandra** (Nutt.) Wood, Bot. & Flor. 124. 1870.

Peplis diandra Nutt.; DC. Prodr. 3: 77. 1828.

Fish Lake, Utah, at 2,700 meters. Wisconsin to Utah, Texas, and Florida.

2. ROTALA L.

1. **Rotala ramosior** (L.) Koehne in Mart. Fl. Bras. 13²: 194. 1877.

Ammannia ramosior L. Sp. Pl. 120. 1753.

Wet places in valleys; western Nevada (?). Massachusetts to Washington, southward to South America.

3. AMMANNIA L.

1. **Ammannia coccinea** Rottb. "Pl. Hort. Havn. Descr. 7. 1773."

Wet places in valleys; Carson Valley, Nevada. Indiana to Washington, southward to Florida, California, and South America.

4. LYTHRUM L. LOOSESTRIFE

1. **Lythrum californicum** Torr. & Gray, Fl. N. Amer. 1: 482. 1840.

Wet places of the Covillea belt; Ash meadows, Nevada. California, southern Nevada, and Arizona.

Punica granatum L., pomegranate, of the family Punicaceae, is cultivated in southern Nevada and may escape.

90. ONAGRACEAE. Evening-primrose Family

Annuals or perennials (our species) with alternate or opposite leaves; flowers mostly 4-merous, perfect, axillary and solitary or racemose; calyx gamosepalous; petals 2 to 9 (mostly 4); stamens equaling or twice as many as the sepals; styles united; ovary 1 to 6-celled, inferior; fruit a 4-valved many-seeded capsule, or indehiscent.

Plants acaulescent.

Stigma capitate. Calyx tube 2 to 10 cm. long; petals yellow or white; capsule winged----------**12. TARAXIA.**

Stigma divided into 4 linear lobes.
Capsules distinctly double-crested on the angles; petals white (turning purple)----------10. **PACHYLOPHUS.**
Capsules distinctly winged or sharp-angled; petals yellow or white.
11. LAVAUXIA.

Plants caulescent.
Flowers 2-merous, small, racemose. Calyx with short tube; petals white, emarginate; fruit indehiscent, 1 or 2-celled, obovoid, covered with hooked hairs; leaves petioled, cordate-ovate, sinuate-denticulate; plants 30 to 60 cm. high, glabrous----------18. **CIRCAEA.**
Flowers 4-merous.
Calyx cleft to the ovary or nearly so.
Flowers large, purple or rose-colored; petals broadly obovate; stigma 4-lobed; capsule linear; seeds with a coma--3. **CHAMAENERION.**
Flowers minute; petals 1 to 6 mm. long, white or rose-colored; seeds without coma.
Sepals erect, persistent; petals reddish, sometimes wanting; capsule short, truncate, obovoid; leaves opposite, oval or ovate to spatulate, 1 to 3 cm. long; plants with creeping or floating stems 10 to 50 cm. long----------1. **ISNARDIA.**
Sepals deciduous; capsule linear, 2-celled; leaves linear; diffusely branching annuals----------16. **GAYOPHYTUM.**
Calyx with a more or less distinct tube.
Fruit indehiscent, nutlike, ribbed or angled. Flowers white, pink, or red, in racemes or panicles; petals clawed; stamens 8; ovary 4-celled; annual, biennial, or perennial herbs with alternate leaves.
17. GAURA.
Fruit dehiscent, capsular.
Leaves opposite (those of the inflorescence sometimes alternate). Seeds with a coma.
Calyx tube 15 mm. long or more; petals bright red; leaves sessile.
2. ZAUSCHNERIA.
Calyx tube short; petals white, pink, or purple, 8 mm. long or less; leaves sessile or petioled----------4. **EPILOBIUM.**
Leaves alternate (opposite in *Clarkia*). Petals purple to white or yellow.
Anthers attached at base.
Petals clawed, purple. Calyx lobes reflexed------6. **CLARKIA.**
Petals sessile. Calyx tube above the ovary obconical.
Petals entire (in our species); capsule linear, coriaceous, canescent; seeds angled or margined. Leaves linear; simple or branching annuals----------7. **GODETIA.**
Petals obovate-cuneiform, 2-lobed; capsule ovate-oblong to linear, sessile; seeds few in each cell, somewhat angled, smooth. Erect leafy annuals with small spicate flowers.
5. BOISDUVALIA.
Anthers versatile. Seeds without coma.
Stigma divided into 4 linear lobes.
Stamens unequal; capsule crested. Low-stemmed or acaulescent plants----------10. **PACHYLOPHUS.**
Stamens equal; capsule terete, bluntly angled, not crested.
Petals yellow (turning purple in age); seeds in 2 rows in each cell, prismatic; biennials or perennials 0.5 to 2 meters high, with toothed leaves----------8. **OENOTHERA.**

Petals white or pink; seeds in 1 row in each cell, terete; annuals or perennials, with toothed or pinnatifid leaves. **9. ANOGRA.**

Stigma discoid or capitate.

Calyx tube funnelform above, 3 to 4 cm. long. Petals yellow (turning rose), 2 cm. long; pubescent cespitose perennial 10 to 20 cm. high, with numerous linear or linear-spatulate leaves---------- **13. GALPINSIA.**

Calyx tube very short. Stigma capitate.

Capsule linear, sessile, tapering above. **14. SPHAEROSTIGMA.**

Capsule clavate or cylindric, pediceled, obtuse. **15. CHYLISMIA.**

1. ISNARDIA L.

1. Isnardia palustris L. Sp. Pl. 120. 1753.

Ludwigia nitida Michx. Fl. Bor. Amer. 1: 87. 1803.

In ponds and along creeks. Plumas County, California. North America, southward through Mexico; Europe and Asia.

2. ZAUSCHNERIA Presl

Leaves oblanceolate to elliptic-oblanceolate, 1.5 to 3 cm. long, denticulate, pilose (glabrate in age). Calyx tube 2 cm. long; petals oblanceolate; plants 20 to 40 cm. high, pilose---------- **2. Z. crassifolia.**

Leaves ovate to oblong-lanceolate, entire to denticulate. Petals obcordate; stamens mostly exserted; plants 20 to 40 cm. high.

Leaves sparsely villous; capsule glandular---------- **1. Z. garrettii.**

Leaves silvery or grayish-pubescent; capsule viscid-pubescent-- **3. Z. latifolia.**

1. Zauschneria garrettii A. Nels. Proc. Biol. Soc. Washington **20:** 36. 1907.

Foothills and canyons, upward to 2,700 meters. Wyoming, Utah, and Nevada.

2. Zauschneria crassifolia Rydb. Fl. Rocky Mount. 590, 1064. 1917.

Canyons and sandy soil. Arizona and southern Utah.

3. Zauschneria latifolia (Hook.) Greene, Pittonia **1:** 25. 1887.

Zauschneria californica latifolia Hook. in Curtis's Bot. Mag. **76:** *pl. 4493*, 1850.

Zauschneria argentea A. Nels. Proc. Biol. Soc. Washington **18:** 173. 1905.

Mountain sides; Sierra Nevada. California and western Nevada.

3. CHAMAENERION Adans.

Plants 10 to 40 cm. high; stems glabrous below; leaves 2 to 5 cm. long, ovate to lanceolate, puberulent; inflorescence short---------- **1. C. latifolium.**

Plants 0.5 to 2 meters high; stems glabrous below; leaves 5 to 15 cm. long, lanceolate to linear-lanceolate, glabrate; inflorescence elongate. **2. C. angustifolium.**

1. Chamaenerion latifolium (L.) Sweet, Hort. Brit. ed. 2. 198. 1830.

Epilobium latifolium L. Sp. Pl. 347. 1753.

Spruce and alpine belts. Colorado to Nevada, northward to arctic America.

2. Chamaenerion angustifolium (L.) Scop. Fl. Carn. ed. 2. 1: 271. 1772.

BLOOMING SALLY.

Epilobium angustifolium L. Sp. Pl. 347. 1753.

Aspen and spruce belts. Greenland to Alaska, southward to North Carolina, New Mexico, and California; also in Europe and Asia.

4. EPILOBIUM L. WILLOW-WEED

Stems more or less pubescent or strigose throughout.
Petals 1 to 2 mm. long, white or rose-colored; capsule clavate, 1 to 2 cm. long.
Leaves elliptic-lanceolate, petioled, 1 to 3 cm. long; annual, 10 to 30 cm. high——18. E. minutum.
Petals 3 to 5 mm. long, pink or light purple; capsule 4 to 6 cm. long.
Leaves ovate or ovate-lanceolate, 3 to 4 cm. long, denticulate; perennial, 40 to 60 cm. high, more or less glandular——2. E. palmeri.
Leaves linear, 2 to 5 cm. long, revolute; perennial, 20 to 40 cm. high.
17. E. lineare.
Stems glabrous or nearly so below, glabrous, pubescent, or glandular above.
Petals about 12 mm. long, obcordately 2-lobed, rose-colored. Leaves sessile, ovate, 8 to 12 mm. long, toothed; stems decumbent, 8 to 15 cm. long.
1. E. obcordatum
Petals 10 mm. long or less.
Leaves linear to narrowly lanceolate or oblanceolate, sessile or petioled (often broader in no. 9).
Capsules glandular or cinereous.
Capsules cinereous, 4 to 7 cm. long; petals 3 to 4 mm. long; perennials, with erect stems, 20 cm. high or more——16. E. wyomingense.
Capsules glandular, clavate, 15 to 25 mm. long; petals purple or rose, 5 to 7 mm. long; annual, with rigid stems 40 to 80 cm. high.
21. E. adenocladon.
Capsules glabrous or sparingly pubescent.
Stem diffusely branched, 30 to 80 cm. high. Capsules about 2 cm. long.
Leaves linear-subulate, 2 to 3 cm. long, thick; petals 3.5 to 5 mm. long, rose-colored; capsule glabrous, clavate——19. E. subulatum.
Leaves linear-lanceolate, not thick; petals 5 to 7 mm. long, lilac or rose-colored; capsule usually pubescent——20. E. paniculatum.
Stem simple, erect.
Petals 5 to 8 mm. long, purplish, rose, or white. Capsule 6 to 8 cm. long; leaves oblong-lanceolate to oblanceolate, 2 to 5 cm. long, entire or remotely denticulate——14. E. glaberrimum.
Petals 3 to 5 mm. long, violet to white.
Leaves 2 to 4 cm. long, narrowly lanceolate, acute, repand-dentate; capsule almost erect, 3 to 5 cm. long.
9. E. drummondii.
Leaves 10 to 15 mm. long, oblong or linear, obtuse, entire or remotely denticulate; capsule 2 to 4 cm. long.
13. E. oregonense.
Leaves lanceolate or broader.
Leaves more or less distinctly petioled.
Petals about 3 mm. long, white or purplish. Leaves elliptic, obtuse, 2 to 5 cm. long; stem 10 to 30 cm. high, decumbent.
10. E. alpinum.
Petals 4 to 8 mm. long.
Leaves 1 to 2 cm. long, broadly oval, obtuse. Petals rose-colored, 5 to 6 mm. long; capsule more or less arcuate, 25 mm. long; plants matted, 10 cm. high or less——12. E. clavatum.
Leaves 2 to 7 cm. long, lanceolate or elliptic-ovate.

Inflorescence crisp-hairy, slightly if at all glandular; leaves elliptic-ovate, obtuse, entire or repand. Petals lilac to violet; capsules 5 cm. long, erect; seeds smooth or nearly so; plants 10 to 30 cm. high, stoloniferous----------11. **E. hornemannii.**

Inflorescence more or less densely glandular-hairy; leaves ovate to elliptic-lanceolate, mostly acute, 3 to 7 cm. long. Plants 0.3 to 1 meter high, producing rosettes.

Petals purple or rose-colored, 5 to 6 mm. long; capsule 4 to 6 cm. long, pubescent----------5. **E. occidentale.**

Petals pink, 4 mm. long; capsule 4 to 5 cm. long, glabrate in age----------6. **E. adenocaulon.**

Leaves sessile or subsessile.

Leaves with acute base, ovate to lanceolate. Inflorescence and capsule more or less glandular; petals white, 4 to 5 mm. long; plants 50 to 60 cm. high----------8. **E. stramineum.**

Leaves with rounded or cordate base, ovate to broadly lanceolate, 3 to 6 cm. long. Stems 20 to 60 cm. high.

Petals white or pale purple, 4 mm. long.

Capsule 4 to 5 cm. long, crisp-pubescent. Stem strict and simple. 7. **E. rubescens.**

Capsule 5 cm. long, glabrous in age----------15. **E. fastigiatum.**

Petals pink or purple, 5 to 7 mm. long. Leaves ovate to elliptic-lanceolate, 3 to 6 cm. long.

Capsule 5 to 6 cm. long, crisp-hairy; stem crisp-hairy in lines above----------3. **E. ovatifolium.**

Capsule 4 to 6 cm. long, glabrous or pubescent; stem crisp-hairy above, the pubescence scattered----------4. **E. brevistylum.**

1. **Epilobium obcordatum** A. Gray, Proc. Amer. Acad. **6**: 532. 1865.
Spruce and alpine belts. California, Oregon, and Nevada.

2. **Epilobium palmeri** Rydb. Bull. Torrey Club **31**: 569. 1904.
Wet meadows, at 2,000 meters. Montana to Colorado, westward to Idaho and Utah.

3. **Epilobium ovatifolium** Rydb. Bull. Torrey Club **31**: 567. 1904.
Spruce and alpine belts. Colorado, Utah, and New Mexico.

4. **Epilobium brevistylum** Barbey; Brewer & Wats. Bot. Calif. **1**: 220. 1876.
Wet places and along ponds and creeks of the aspen and spruce belts. Montana to Colorado, westward to Washington and California.

5. **Epilobium occidentale** (Trel.) Rydb. Mem. N. Y. Bot. Gard. **1**: 275. 1900.
Epilobium adenocaulon occidentale Trel. Rep. Mo. Bot. Gard. **2**: 95. 1891.
Wet ground and along creeks of the aspen and spruce belts. Alberta and British Columbia, southward to Colorado and California. Perhaps only a form of *E. adenocaulon.*

6. **Epilobium adenocaulon** Hausskn. Oesterr. Bot. Zeitschr. **29**: 119. 1879.
Wet ground on plains and in canyons, upward to the spruce belt. New Brunswick to Pennsylvania, Colorado, California and Alaska.

7. **Epilobium rubescens** Rydb. Bull. Torrey Club **31**: 568. 1904.
Aspen and spruce belts. Colorado and Utah.

8. **Epilobium stramineum** Rydb. Bull. Torrey Club **31**: 568. 1904.
Wet places in the spruce and subalpine belts. Wyoming, Colorado, and Utah.

9. Epilobium drummondii Hausskn. Monogr. Epilob. 271. 1884.

Wet places of the aspen and spruce belts. Saskatchewan to British Columbia, southward to Colorado and Nevada.

10. Epilobium alpinum L. Sp. Pl. 348. 1753.

Meadows and willow groves of the aspen, spruce, and alpine belts. Greenland to Alaska, southward tc New Hampshire, Colorado, and California; also in northern Europe and Asia.

11. Epilobium hornemannii Reichenb. Icon. Bot. Pl. Crit. **2**: 73. *pl. 180, f. 313.* 1824.

Meadows and shady slopes of the spruce and subalpine belts. Greenland to Alaska, southward to New Hampshire, Colorado, and California; also in Europe and Asia.

12. Epilobium clavatum Trel. Rep. Mo. Bot. Gard. **2**: 111. 1891.

Meadows and rocky places of the spruce and alpine belts. British Columbia to Colorado and Oregon.

13. Epilobium oregonense Hausskn. Monogr. Epilob. 276. 1884.

Yellow pine, aspen, and spruce belts. British Columbia to Nevada and California.

14. Epilobium glaberrimum Barbey; Brewer & Wats. Bot. Calif. **1**: 220. 1876.

Canyons of the yellow pine, aspen, and spruce belts. Washington to western Nevada and California.

15. Epilobium fastigiatum (Nutt.) Piper, Contr. U. S. Nat. Herb. **11**: 404. 1906.

Epilobium affine fastigiatum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 489. 1840.
Epilobium platyphyllum Rydb. Bull. Torrey Club **40**: 63. 1913.

Wet places of the aspen and spruce belts. British Columbia to Utah and California.

16. Epilobium wyomingense A. Nels. Bot. Gaz. **30**: 194. 1900.

Plains and canyons, upward to 2,500 meters; Uintah Mts. (?). Saskatchewan to Alaska, southward to Colorado and Utah.

17. Epilobium lineare Muhl. Cat. Pl. 39. 1813.

Wet places of the artemisia, pinyon, and yellow pine belts. New Brunswick to British Columbia, southward to Delaware, Oklahoma, New Mexico, and Utah.

18. Epilobium minutum Lindl.; Hook. Fl. Bor. Amer. **1**: 207. 1834.

Canyons and foothills of the artemisia and yellow pine belts. British Columbia to California and western Nevada.

19. Epilobium subulatum (Hausskn.) Rydb. Bull. Torrey Club **40**: 64. 1913.

Epilobium paniculatum subulata Hausskn. Monogr. Epilob. 247. 1884.

Alkali flats and hillsides, upward to 2,000 meters. British Columbia to Utah and California.

20. Epilobium paniculatum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 490. 1840.

Plains, mountain meadows, and canyons, upward to 2,400 meters. Alberta and British Columbia, southward to Colorado, Arizona, and California.

21. Epilobium adenocladon (Hausskn.) Rydb. Bull. Torrey Club **33**: 146. 1906.

Epilobium paniculatum adenocladon Hausskn. Monogr. Epilob. 247. 1884.

Plains along watercourses and in canyons of the artemisia and pinyon belts New Brunswick to Alaska, southward to Pennsylvania, Colorado, and Nevada.

5. BOISDUVALIA Spach

Upper leaves ovate-lanceolate, much broader than the lower ones, acuminate; inflorescence dense, spikelike. Petals 5 mm. long; capsule ovate-oblong, 4 to 8 mm. long; plants pubescent or villous, 15 to 60 cm. high. **1. B. densiflora.**

Upper leaves oblong-lanceolate, not broader than the lower; inflorescence not dense; the flowers solitary or in axillary spikelets.

Plants glabrous or sparingly pubescent; leaves ovate to lanceolate, entire or serrulate, acute; petals purple, 2 mm. long; capsule ovate-oblong, 4 to 8 mm. long **2. B. glabella.**

Plants more or less densely canescent; leaves linear-lanceolate to lanceolate; petals rose-purple, 5 mm. long; capsule oblong, 1 cm. long. **3. B. sparsiflora.**

1. **Boisduvalia densiflora** (Lindl.) S. Wats. in Brewer & Wats. Bot. Calif. 1: 233. 1876.
Oenothera densiflora Lindl. Bot. Reg. 19: *pl. 1593*. 1833.
Plains and meadows, upward to 1,800 meters. British Columbia to Nevada and California.

2. **Boisduvalia glabella** (Nutt.) Walp. Repert. Bot. 2: 89. 1843.
Oenothera glabella Nutt.; Torr. & Gray, Fl. N. Amer. 1: 505. 1840.
Plains, meadows, and river valleys. Saskatchewan to British Columbia, southward to Nevada and California.

3. **Boisduvalia sparsiflora** Heller, Muhlenbergia 1: 42. 1904.
Meadows and river valleys. Eastern California and Nevada.

6. CLARKIA Pursh. CLARKIA

Petals 3-lobed, 12 to 25 mm. long; capsule linear, 15 to 25 mm. long; leaves linear to linear-lanceolate, 3 to 7 cm. long, entire **1. C. pulchella.**

Petals entire, rhomboidal, 5 to 7 mm. long; capsule linear, 15 to 25 mm. long; leaves oblong-lanceolate or oblong-ovate, 3 to 5 cm. long, entire. **2. C. rhomboidea.**

1. **Clarkia pulchella** Pursh, Fl. Amer. Sept. 260. 1814.
Plains and hillsides, upward to 1,500 meters; northern Nevada (?). Alberta and British Columbia, southward to Montana, Oregon, and California.

2. **Clarkia rhomboidea** Dougl.; Hook. Fl. Bor. Amer. 1: 214. 1834.
Foothills and canyons, upward to 2,400 meters. Idaho and Washington to Nevada and California.

7. GODETIA Spach. GODETIA

1. **Godetia quadrivulnera** (Dougl.) Spach, Hist. Nat. Vég. 4: 389. 1835.
Oenothera quadrivulnera Dougl. in Edwards's Bot. Reg. 13: *pl. 1119*. 1827.
Foothills of Sierra Nevada. Washington to California and western Nevada.

8. OENOTHERA L. EVENING-PRIMROSE

Calyx tube 10 cm. long or more, canescent. Petals 4 cm. long; capsule about 4 cm. long, canescent; leaves linear or linear-lanceolate, 15 cm. long or less; plants 1 meter high or less, canescent **1. O. longissima.**

Calyx tube (free portion) 4 cm. long or less.

Petals 1 to 2 cm. long; stem leaves lanceolate, 15 cm. long or less, repand-dentate; capsule 2 to 3 cm. long; annual or biennial, 1 meter high or less, strigose and hirsute **2. O. strigosa.**

Petals 3 to 4 cm. long; stem leaves lanceolate, 20 cm. long or less, repand-dentate; capsule 3 to 5 cm. long; biennial, 1 meter high or less, more or less canescent and hirsute----------**3. O. hookeri.**

1. Oenothera longissima Rydb. Bull. Torrey Club **40:** 65. 1913.

Sandy river banks and canyons; Grand Canyon. Utah and Arizona.

2. Oenothera strigosa (Rydb.) Mackenz. & Bush, Man. Fl. Jackson County 139. 1902.

Onagra strigosa Rydb. Mem. N. Y. Bot. Gard. **1:** 278. 1900.

Plains, canyons, and slopes, upward to 2,400 meters. Minnesota to Kansas, Utah, and Washington.

3. Oenothera hookeri Torr. & Gray, Fl. N. Amer. **1:** 493. 1840.

Plains, canyons, and moist slopes of the artemisia, pinyon, yellow pine, and aspen belts. Montana to British Columbia, southward to Mexico.

9. ANOGRA Spach

Tips of calyx lobes not free in bud. Calyx tube 15 to 25 mm. long; petals 2 to 3 cm. long; capsule linear, 2 to 4 cm. long; leaves sinuate-dentate to sinuate-pinnatifid; biennial or perennial, 10 to 30 cm. high, cinerous-puberulent and with scattered long silky hairs--------**1. A. trichocalyx.**

Tips of calyx lobes free in bud.

Capsule oblong, 10 to 15 mm. long, 4 mm. thick. Calyx tube 1 to 2 cm. long, strigose; petals 10 to 15 mm. long; leaves pinnatifid, with linear lobes; diffusely branching perennial, 10 to 30 cm. high, strigose.

9. A. coronopifolia.

Capsule linear, 2 to 5 cm. long, 3 mm. thick or less.

Calyx grayish-strigose.

Leaves all long-petioled, oblanceolate, subentire or sinuate-toothed, strigose. Calyx tube canescent; petals 3 cm. long or less, white, with yellow bases; annual, 10 to 15 cm. high, with simple stem.

2. A. simplex.

Stem leaves sessile or short-petioled.

Leaves (stem) narrowly oblanceolate, acuminate, mostly short-petioled, toothed to irregularly pinnatifid, 5 to 10 cm. long. Petals obcordate, 3 cm. long; plants hoary-pubescent or villous, 10 to 30 cm. high, with decumbent stems----------**3. A. californica.**

Leaves ovate to oblong or linear-lanceolate.

Leaves ovate to oblong (rarely narrower), dentate or subentire; petals obcordate, about 2 cm. long; strigose perennial, 10 to 30 cm. high----------**4. A. latifolia.**

Leaves linear-lanceolate, deeply pinnatifid to nearly entire, canescent-strigose; petals rhombic, 1.5 to 2 cm. long; cinereous perennial, 20 to 40 cm. high----------**5. A. runcinata.**

Calyx glabrous, glandular-puberulent, or sparingly long-hairy and strigose.

Stem leaves subentire, dentate, or pinnately parted.

Calyx pilose, the tips short. Petals 2 cm. long; perennial 30 to 50 cm. high, with sinuate-dentate to parted leaves--------**8. A. vreelandii.**

Calyx glabrous or nearly so, the tips slender. Glabrous perennials, 20 to 50 cm. high.

Leaves lanceolate to linear-lanceolate, entire, dentate, or sinuate-pinnatifid; calyx tube 2 to 3 cm. long; petals 15 to 25 mm. long, obcordate----------**6. A. pallida.**

Leaves linear or narrowly oblanceolate, entire or few-toothed; calyx tube 1.5 to 2 cm. long; petals 15 mm. long or less, emarginate.

7. A. leptophylla.

1. Anogra trichocalyx (Nutt.) Small, Bull. Torrey Club **23**: 174. 1896.
Oenothera trichocalyx Nutt. & Gray, Fl. N. Amer. **1**: 494. 1840.
Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Wyoming to Arizona and California.

2. Anogra simplex Small, Bull. Torrey Club **23**: 175. 1896.
Low, sandy places of the Covillea belt. Southern Utah, northern Arizona, and southern Nevada.

3. Anogra californica (S. Wats.) Small, Bull. Torrey Club **23**: 176. 1896.
Oenothera albicaulis californica S. Wats. Proc. Amer. Acad. **8**: 582. 1873.
Valleys of the Covillea and artemisia belts; Inyo County, California. Arizona and southern California.

4. Anogra latifolia Rydb. Bull. Torrey Club **31**: 570. 1904.
Oenothera pallida latifolia Rydb. Contr. U. S. Nat. Herb. **3**: 159. 1895.
Plains and foothills of the artemisia and pinyon belts. Nebraska to Kansas, Nevada, and Idaho.

5. Anogra runcinata (Engelm.) Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 151. 1913.
Oenothera albicaulis runcinata Engelm. Amer. Journ. Sci. II. **34**: 334. 1862.
Plains and sandhills, at 1,800 to 2,100 meters. Western Texas to southern Utah (?) and Arizona.

6. Anogra pallida (Lindl.) Britton, Mem. Torrey Club **5**: 234. 1894.
Oenothera pallida Lindl. Bot. Reg. **14**: pl. 1142. 1828.
Plains and mountain sides, upward to 2,500 meters. Montana to Utah, westward to British Columbia and California.

7. Anogra leptophylla (Nutt.) Rydb. Bull. Torrey Club **40**: 65. 1913.
Oenothera pallida leptophylla Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 495. 1840.
Oenothera leptophylla Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 495. 1840.
Plains and dry canyons, upward to 1,800 meters. Montana to Utah, westward to British Columbia and California.

8. Anogra vreelandii Rydb. Bull. Torrey Club **31**: 570. 1904.
Foothills and canyons of the artemisia and pinyon belts. Colorado and Utah. Possibly only a form of ***Anogra pallida.***

9. Anogra coronopifolia (Torr. & Gray) Britton, Mem. Torrey Club **5**: 234. 1894.
Oenothera coronopifolia Torr. & Gray, Fl. N. Amer. **1**: 495. 1840.
Artemisia plains, canyons, and mountain sides, upward to 2,600 meters. South Dakota to Kansas, Arizona, and Utah.

10. PACHYLOPHUS Spach

Calyx tube and fruit glabrous or nearly so. Petals obcordate, white, turning pink.
Plants glabrous or nearly so. Leaves 10 to 20 cm. long, oblanceolate, sinuate-dentate, the teeth triangular, petioles winged; petals 3 to 4 cm. long; fruit lance-ovoid, with rounded tubercles——————**1. P. caespitosus.**
Plants hairy.
Calyx tube 3 to 6 cm. long; petals 2 to 3 cm. long; leaves oblong or oblanceolate, sinuate or pinnately toothed, 3 to 8 cm. long; capsule oblong, obscurely tubercled——————**3. P. montanus.**
Calyx tube 6 to 14 cm. long; petals 3.5 to 5 cm. long; leaves broadly oblanceolate, irregularly sinuate-dentate, 8 to 15 cm. long; capsule with strong sinuate ridges——————**4. P. macroglottis.**

Calyx tube and fruit more or less hirsute, pilose, or pubescent.

Leaves lyrate-pinnatifid, 4 to 7 cm. long, the terminal lobe oval, sinuate-dentate, 1 to 2 cm. long, the lateral lobes small, oblong to deltoid. Calyx tube about 3 cm. long, pilose; petals 1.5 to 2 cm. long; capsule strongly tuberculate on the angles----------2. P. johnsoni.

Leaves sinuate-toothed or lobed.

Plants canescent-strigose throughout. Leaves pale green, oblanceolate; calyx tube 5 to 8 cm. long; petals 2 to 4 cm. long; capsule strongly tuberculate. 8. P. canescens.

Plants not canescent-strigose.

Calyx tube about 5 cm. long. Petals about 2 cm. long; capsule ovoid, sessile, scarcely tuberculate; leaves oblanceolate, 2 to 4 cm. long, hirsute, sinuate-toothed; plants strongly cespitose----6. P. crinitus.

Calyx tube 7 to 12 cm. long or more.

Fruit sessile or nearly so, conic-ovoid, 4 to 5 cm. long; leaves oblanceolate, 10 to 20 cm. long, toothed, runcinately lobed or divided, more or less hirsute-villous----------5. P. hirsutus.

Fruit stipitate, tapering at both ends, with slightly tuberculate ridges: leaves oblanceolate, sinuate-toothed to runcinate, 15 to 25 cm. long----------7. P. marginatus.

1. **Pachylophus caespitosus** (Nutt.) Raim.; Engl. & Prantl. Pflanzen Fam. 3': 215. 1893.

Oenothera caespitosa Nutt. Fraser's Cat. 1813.

Pachylophus glaber A. Nels. Bull. Torrey Club 31: 242. 1904.

Plains and dry hillsides. South Dakota and Nebraska, to Colorado and Nevada.

2. **Pachylophus johnsoni** (Parry) Rydb. Fl. Rocky Mount. 598, 1064. 1917.

Oenothera johnsoni Parry, Amer. Nat. 9: 270. 1875.

Hillsides of the Covillea belt. Southern Utah to California.

3. **Pachylophus montanus** (Nutt.) A. Nels. Bull. Torrey Club 26: 128. 1899.

Oenothera montana Nutt.; Torr. & Gray, Fl. N. Amer. 1: 500. 1840.

Plains and mountain sides, upward to 2,000 meters. Saskatchewan to Nebraska, westward to Idaho and Nevada.

4. **Pachylophus macroglottis** Rydb. Bull. Torrey Club 30: 259. 1903.

Dry rocky mountain slopes and canyons, upward to 2,700 meters. Wyoming to New Mexico and Arizona.

5. **Pachylophus hirsutus** Rydb. Bull. Torrey Club 31: 571. 1904.

Canyons and mountain sides, upward to 2,600 meters. Wyoming to New Mexico, Arizona, and Utah.

6. **Pachylophus crinitus** Rydb. Fl. Rocky Mount. 598, 1064. 1917.

Artemisia and pinyon belts. Central Utah.

7. **Pachylophus marginatus** (Nutt.) Rydb. Bull. Torrey Club 33: 146. 1906.

Oenothera marginata Nutt.; Torr. & Gray, Fl. N. Amer. 1: 500. 1840.

Plains and rocky mountain slopes of the artemisia, pinyon, yellow pine, and aspen belts. Colorado to Nevada, Idaho, and Oregon.

8. **Pachylophus canescens** Piper, Contr. U. S. Nat. Herb. 11: 409. 1906.

Plains, alkali meadows, and hillsides. Montana to western Nebraska, westward to Washington and California.

11. LAVAUXIA Spach

Leaves green, glabrous or puberulent, oblong-lanceolate, more or less deeply runcinate-pinnatifid, 10 to 25 cm. long; calyx tube 4 to 7 cm. long; petals yellow, turning pink, 12 to 18 mm. long; capsule glabrate, 3 cm. long or less ..... 1. L. flava.

Leaves strigose-canescent, oblanceolate, entire to sinuate-pinnatifid, 5 to 20 cm. long; calyx tube 10 to 15 cm. long; petals yellow, turning rose-colored, 4 to 5 cm. long; capsule 3 cm. long or less, canescent ..... 2. L. howardi.

1. **Lavauxia flava** A. Nels. Bull. Torrey Club **31**: 243. 1904.

Foothills and canyons of the artemisia belt, and on mountain sides upward to 3,000 meters. Saskatchewan to Nebraska and California.

2. **Lavauxia howardi** (Jones) A. Nels. Bot. Gaz. **34**: 368. 1902.

Oenothera howardi Jones; Léveillé, Monogr. Oenothera 39. 1902.

Plains and foothills of the Covillea and artemisia belts. Utah and Nevada.

12. TARAXIA Nutt.

Leaves mostly entire or repand-toothed, lanceolate to oblanceolate, 5 to 20 cm. long. Calyx tube 3 to 5 cm. long; petals pale yellow, about 10 mm. long ..... 1. T. subacaulis.

Leaves pinnatifid, more or less pubescent, 5 to 20 cm. long, linear-lanceolate to narrowly oblanceolate, the segments or lobes irregular. Calyx tube shorter than the leaves.

Petals about 5 mm. long, obovate, yellow; calyx tube 15 mm. long or more; capsule 15 mm. long, tuberculate ..... 2. T. breviflora.

Petals 10 to 14 mm. long, emarginate or rounded, yellow; calyx tube 25 mm. long or more; capsule narrowly ovoid, round-ridged ..... 3. T. tanacetifolia.

1. **Taraxia subacaulis** (Pursh) Rydb. Mem. N. Y. Bot. Gard. **1**: 281. 1900.

Jussiaea subacaulis Pursh, Fl. Amer. Sept. 304. 1814.

Moist places and along creeks in canyons of the pinyon, yellow pine, and aspen belts. Montana to Colorado and California.

2. **Taraxia breviflora** (Torr. & Gray) Nutt.; Rydb. Fl. Rocky Mount. 600. 1917.

Oenothera breviflora Torr. & Gray, Fl. N. Amer. **1**: 506. 1840.

Moist places in the aspen, spruce, and subalpine belts. Alberta and British Columbia, southward to Utah and Nevada.

3. **Taraxia tanacetifolia** (Torr. & Gray) Piper, Contr. U. S. Nat. Herb. **11**: 405. 1906.

Oenothera tanacetifolia Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **2**: 121. *pl. 4*. 1854.

Meadows and about watercourses of the artemisia, pinyon, and yellow pine belts. Washington to Nevada and California.

13. GALPINSIA Britton

1. **Galpinsia lavandulaefolia** (Torr. & Gray) Small, Fl. Southeast. U. S. 845. 1903.

Oenothera lavandulaefolia Torr. & Gray, Fl. N. Amer. **1**: 501. 1840.

Plains and foothills of the artemisia and pinyon belts. Kansas and Texas, westward to Utah and Nevada.

14. SPHAEROSTIGMA Fisch. & Mey.

Plants glabrous or nearly so below.
Stems 10 cm. high or less; leaves narrowly linear, entire, 1 to 3 cm. long; calyx tube 2 mm. long or less; petals yellow, 3 mm. long; capsule linear, 1 to 3 cm. long, straight or curved----------2. S. contortum.
Stems 20 cm. high or more; leaves lanceolate or oblanceolate, 2 to 6 cm. long, entire or denticulate; calyx tube 4 mm. long; petals 3 to 4 mm. long, white, turning pink; capsule 2 cm. long, curved or twisted.
11. S. decorticans.
Plants more or less pubescent or glandular throughout, rarely glabrous.
Leaves linear to linear-oblanceolate.
Leaves more or less denticulate, 1 to 3 cm. long, 1 to 3 mm. wide. Calyx tube 2 mm. long; petals 3 to 4 mm. long, yellow; annual, 10 to 30 cm. high, branching----------3. S. pubens.
Leaves mostly entire or distantly toothed.
Petals yellow.
Petals about 10 mm. long. Capsule 2 to 3 cm. long; plants 10 to 30 cm. high or more; leaves linear-oblong or linear-oblanceolate.
5. S. veitchianum.
Petals 1 to 4 mm. long. Leaves very narrow.
Plants low, 3 to 10 cm. high, puberulent; petals about 1 mm. long; capsule 6 to 7 mm. long----------1. S. andinum.
Plants 10 to 30 cm. high, strigillose or pubescent; petals 3 to 4 mm. long; capsule 2 to 3 cm. long----------4. S. strigulosum.
Petals white.
Petals 5 to 6 mm. long; capsule 2 to 3 cm. long, more or less contorted; plants 20 to 40 cm. high, more or less glandular; leaves 2 to 5 cm. long----------6. S. refractum.
Petals 4 mm. long; capsule about 1 cm. long, strikingly contorted; plants about 10 cm. high, sparingly puberulent, with crowded leaves 1 to 3 cm. long----------8. S. tortuosum.
Leaves broader. Petals white, cream, or rose-colored; plants annual.
Plants villous.
Leaf blades 3 to 5 cm. long, obovate to broadly spatulate. Petals 7 to 8 mm. long----------14. S. macrophyllum.
Leaf blades 2.5 cm. long or less, spatulate to oval or obovate.
Petals obovate, 3 to 5 mm. long; capsule 15 mm. long, twisted at base.
15. S. utahense.
Petals suborbicular or nearly so, 8 mm. long; capsule 12 mm. long or more, straight----------13. S. senex.
Plants glabrous, puberulent or glandular.
Petals 1 to 2 mm. long, yellow or ochroleucous.
Capsules 2 cm. long; plants more or less strigose-pubescent; leaves linear-oblong to oblanceolate----------7. S. tortum.
Capsules 3 to 5 cm. long; plants viscid-puberulent; leaves lanceolate or oblanceolate----------9. S. chamaenerioides.
Petals 4 to 10 mm. long.
Petals 10 mm. long, yellow. Leaves linear-oblong to oval.
5. S. veitchianum.
Petals 4 to 6 mm. long, yellow or white.
Capsule 10 to 15 mm. long; leaf blades ovate, dentate, acute, hirsute beneath----------12. S. boothii.
Capsule 20 to 25 mm. long; leaf blades oblanceolate to elliptic, more or less strigose----------10. S. alyssoides.

1. **Sphaerostigma andinum** (Nutt.) Walp. Repert. Bot. **2**: 79. 1843.
Oenothera andina Nutt; Torr. & Gray, Fl. N. Amer. **1**: 512. 1840.
Valleys and foothills of the artemisia and pinyon belts. Montana to Utah, westward to Washington and Nevada.

2. **Sphaerostigma contortum** (Dougl.) Walp. Repert. Bot. **2**: 78. 1843.
Oenothera contorta Dougl.; Lehm. in Hook. Fl. Bor. Amer. **1**: 214. 1834.
Oenothera parvula Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 511. 1840.
Plains and rocky hillsides of the artemisia, pinyon, and yellow pine belts. Washington to Wyoming, Arizona, and California.

3. **Sphaerostigma pubens** (S. Wats.) Rydb. Bull. Torrey Club **33**: 146. 1906.
Onocthera strigulosa pubens S. Wats. Proc. Amer. Acad. **8**: 594. 1873.
Sphaerostigma orthocarpa Nels. & Kennedy, Proc. Biol. Soc. Washington **19**: 155. 1906.
Foothills and canyons, upward to 1,800 meters. Nevada and California.

4. **Sphaerostigma strigulosum** Fisch. & Mey. Ind. Sem. Hort. Petrop. 50. 1835.
Oenothera strigulosa Torr. & Gray, Fl. N. Amer. **1**: 512. 1840.
Sphaerostigma filiforme A. Nels. Bot. Gaz. **40**: 57. 1905.
Plains and slopes of the artemisia belt. British Columbia to Utah and southern California.

5. **Sphaerostigma veitchianum** (Hook.) Small, Bull. Torrey Club **23**: 191. 1896.
Oenothera bistorta veitchiana Hook. Curtis's Bot. Mag. **84**: *pl. 5078*. 1858.
Plains and hillsides of the Covillea belt; Fort Mohave, Arizona and southern California.

6. **Sphaerostigma refractum** (S. Wats.) Small, Bull. Torrey Club **23**: 192. 1896.
Oenothera refracta S. Wats. Proc. Amer. Acad. **17**: 373. 1882.
Desert areas and valleys of the Covillea belt. Southern Utah, Arizona, Nevada, and California.

7. **Sphaerostigma tortum** (Léveillé) A. Nels. Bot. Gaz. **40**: 60. 1905.
Oenothera alyssoides minutiflora S. Wats. Proc. Amer. Acad. **8**: 591. 1873.
Oenothera chamaenerioides torta Léveillé, Monogr. Oenothera 230. 1905.
Plains and canyons of the artemisia and pinyon belts. Wyoming to Colorado, Utah, and Oregon.

8. **Sphaerostigma tortuosum** A. Nels. Proc. Biol. Soc. Washington **17**: 95. 1904.
Dry plains. Idaho and Nevada.

9. **Sphaerostigma chamaenerioides** (A. Gray) Small, Bull. Torrey Club **23**: 189. 1896.
Oenothera chamaenerioides A. Gray, Pl. Wright. **2**: 58. 1853.
Plains and dry hillsides of the Covillea and artemisia belts. Southern Utah to Texas and southern California.

10. **Sphaerostigma alyssoides** (Hook. & Arn.) Walp. Repert. Bot. **2**: 78. 1843.
Oenothera alyssoides Hook. & Arn. Bot. Beechey Voy. 340. 1840.
Rocky canyons and mountain sides, upward to 2,500 meters. Idaho, Utah, Oregon, and California.

11. **Sphaerostigma decorticans** (Hook. & Arn.) Small, Bull. Torrey Club **23**: 191. 1896.
Gaura decorticans Hook. & Arn. Bot. Beechey Voy. 340. 1840.
Oenothera nevadensis Kellogg, Proc. Calif. Acad. **2**: 224. *pl. 70*. 1863.
Sandy plains of the Covillea and artemisia belts. Southern Utah, Arizona, Nevada, and California.

12. Sphaerostigma boothii (Dougl.) Walp. Repert. Bot. **2**: 77. 1843.
Oenothera boothii Dougl.; Hook. Fl. Bor. Amer. **1**: 213. 1834.
Meadows and canyons, upward to 1,800 meters. Washington and Idaho to Utah and California.

13. Sphaerostigma senex A. Nels. Proc. Biol. Soc. Washington **18**: 173. 1905.
Pyramid Lake, Washoe County, Nevada.

14. Sphaerostigma macrophyllum (Small) Rydb. Bull. Torrey Club **40**: 66. 1913.
Sphaerostigma alyssoides macrophyllum Small, Bull. Torrey Club **23**: 192. 1896.
Alkaline plains of the artemisia belt. Utah and Nevada.

15. Sphaerostigma utahense Small, Bull. Torrey Club **23**: 191. 1896.
Alkaline plains, upward to 2,000 meters. Utah and Nevada.

15. CHYLISMIA Nutt.

Flowers axillary. Petals 2 mm. long, obcordate, rose-colored; capsule 12 to 18 mm. long; plants hirsute, 10 cm. high or less; leaves simple, oblong-lanceolate, 1 to 2 cm. long ..... 1. C. pterosperma.
Flowers in terminal racemes, with or without subtending bracts.
Leaves interruptedly pinnatisect, the leaflets unequal, with several to many pairs of segments, strongly and mostly purple-veined and doubly serrate.
Petals 4 to 6 mm. long, light yellow. Capsule 3 cm. long, glabrous; plants 20 to 30 cm. high, glabrous or sparingly pubescent ..... 9. C. parviflora.
Petals 8 mm. long or more.
Plants glabrous, puberulent, strigulose, or glandular, 20 to 40 cm. high. Capsule 2 cm. long.
Plants 20 to 40 cm. high; petals pinkish, white, or purplish, rarely yellow; capsule glabrous ..... 7. C. cruciformis.
Plants 7 to 25 cm. high; petals light rose or orange; capsule puberulent; calyx tube tinged with orange ..... 8. C. clavaeformis.
Plants more or less villous or hirsute.
Segments 12 or more pairs, the alternate larger pairs not much reduced. Stems 20 cm. or more, glabrous; petals yellow, 10 mm. long ..... 5. C. multijuga.
Segments less numerous, the alternate ones mostly reduced.
Petals 8 mm. long, orbicular-obovate; capsule 2 cm. long; plants 40 to 80 cm. high, villous-hirsute ..... 6. C. venosa.
Petals 12 to 15 mm. long, orbicular-obovate; capsule 4 to 6 cm. long; plants 30 to 50 cm. high, more or less densely villous-hirsute. 10. C. brevipes.
Leaves prevailingly simple, or simple and pinnatisect with few to many pairs of segments on the same plant.
Petals 12 to 15 mm. long ..... 10. C. brevipes.
Petals 7 mm. long or less.
Leaves mostly basal (stem leaves few if any), ovate or elliptic, entire or dentate, veiny. Petals 5 to 6 mm. long, yellow, or purplish in age; capsule 15 to 20 mm. long; plants 10 to 30 cm. high, glabrous or puberulent ..... 11. C. scapoidea.
Leaves basal and cauline.
Plants villous and glandular, 20 to 30 cm. high. Leaves ovate-lanceolate, entire to closely denticulate; petals 2 to 3 mm. long, purple; capsule oblong, 8 to 10 mm. long ..... 2. C. heterochroma.

Plants pubescent or pilose.

Capsule 8 to 15 mm. long; petals yellow or orange, 6 to 7 mm. long, often turning purplish; plants 20 cm. high or more, with simple, ovate or oblong-lanceolate, entire or sinuate leaves.

3. C. parryi.

Capsule 4 to 6 mm. long; petals yellow or orange, 6 to 7 mm. long; plants 0.3 to 1 meter high, with lanceolate, sparingly dentate leaves----------**4. C. tenuissima.**

1. **Chylismia pterosperma** (S. Wats.) Small, Bull. Torrey Club **23**: 193. 1896.
Oenothera pterosperma S. Wats. in King, Geol. Expl. 40th Par. **5**: 112. *pl. 14*. 1871.
Foothills of the artemisia and pinyon belts. Utah to California and Oregon.

2. **Chylismia heterochroma** (S. Wats.) Small, Bull. Torrey Club **23**: 193. 1896.
Oenothera heterochroma S. Wats. Proc. Amer. Acad. **17**: 373. 1882.
Plains and rocky slopes, upward to 2,000 meters. Nevada.

3. **Chylismia parryi** (S. Wats.) Small, Bull. Torrey Club **23**: 193. 1896.
Oenothera parryi S. Wats.; Parry, Amer. Nat. **9**: 20. 1875.
Plains and mountain sides of the Covillea and artemisia belts. Southern Utah, northern Arizona, and Nevada.

4. **Chylismia tenuissima** (Jones) Rydb. Bull. Torrey Club **40**: 66. 1913.
Oenothera tenuissima Jones, Proc. Calif. Acad. II. **5**: 683. 1896.
Plains and dry hillsides. Rockville, Utah, altitude 1,220 meters, in clay washes.

5. **Chylismia multijuga** (S. Wats.) Small, Bull. Torrey Club **23**: 193. 1896.
Oenothera multijuga S. Wats. Proc. Amer. Acad. **8**: 595. 1873.
Desert areas and hillsides of the Covillea belt. Southern Utah, Arizona, and Nevada.

6. **Chylismia venosa** Nels. & Kennedy, Muhlenbergia **3**: 140. 1908.
Canyons and dry hillsides of the Covillea and artemisia belts. Southwestern Utah and Nevada.

7. **Chylismia cruciformis** (Kellogg) Howell, Fl. Northw. Amer. 233. 1898.
Oenothera cruciformis Kellogg, Proc. Calif. Acad. **2**: 227. 1863.
Hillsides and canyons, upward to 2,100 meters. Colorado to Arizona, westward to Oregon and the eastern slopes of the Sierra Nevada.

8. **Chylismia clavaeformis** (Torr.) Heller, Muhlenbergia **2**: 105. 1906.
Oenothera scapoidea aurantiaca S. Wats. Proc. Amer. Acad. **8**: 595. 1873.
Desert areas, stony hillsides, and dry canyons of the Covillea, artemisia, and pinyon belts. Southern Utah, Arizona, Nevada, and southern California.

9. **Chylismia parviflora** (S. Wats.) Rydb. Fl. Rocky Mount. 603, 1064. 1917.
Oenothera brevipes parviflora S. Wats; Parry, Amer. Nat. **9**: 271. 1875.
Desert areas and dry canyons of the Covillea belt. Southern Utah, Arizona, and southern California.

10. **Chylismia brevipes** (A. Gray) Small, Bull. Torrey Club **23**: 194. 1896.
Oenothera brevipes A. Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 87. 1857.
Chylismia hirta A. Nels. Bot. Gaz. **47**: 428. 1909.
Desert areas and dry canyons of the Covillea belt. Arizona, Nevada, and southern California.

11. **Chylismia scapoidea** (Nutt.) Small, Bull. Torrey Club **23**: 193. 1896.
Oenothera scapoidea Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 506. 1840.

Desert areas and dry canyons of the artemisia, pinyon, and yellow pine belts. Wyoming and Utah to Idaho and southern California.

16. GAYOPHYTUM A. Juss.

Pedicels equaling the capsules or nearly so. Capsules 3 to 10 mm. long; seeds glabrous; plants 30 to 60 cm. high.
Petals 3 to 6 mm. long ..... 2. G. diffusum.
Petas about 1 mm. long ..... 5. G. ramosissimum.
Pedicels decidedly shorter than the capsules. Petals 1 to 3 mm. long.
Plants more or less pubescent with spreading hairs. Capsule clavate, torulose, 10 mm. long or less; pedicels very short ..... 3. G. caesium.
Plants glabrous except above.
Capsules nearly sessile, glabrous or nearly so, commonly neither torulose nor clavate.
Capsule 10 to 15 mm. long, scarcely flattened ..... 7. G. racemosum.
Capsule 6 to 12 mm. long, flattened contrary to the septum. 8. G. pumilum.
Capsules twice longer than the pedicels or more, torulose.
Capsules linear, 7 to 15 mm. long ..... 6. G. nuttallii.
Capsules more or less clavate.
Petals about 1 mm. long; capsule 6 to 10 mm. long, strigillose; seeds canescent ..... 1. G. lasiospermum.
Petals 1.5 to 3 mm. long; capsule 8 to 12 mm. long; seeds glabrous. 4. G. intermedium.

1. **Gayophytum lasiospermum** Greene, Pittonia **2**: 164. 1891.

Plains, canyons, and pine forests, upward to 2,100 meters. Montana to Washington, southward to Utah (?) and California.

2. **Gayophytum diffusum** Torr. & Gray, Fl. N. Amer. **1**: 513. 1840.

Plains, canyons, and mountain parks, upward to 2,700 meters. Montana to Washington, southward to Utah and California.

3. **Gayophytum caesium** Torr. & Gray, Fl. N. Amer. **1**: 514. 1840.

Canyons, open slopes, and margins of ponds, upward to 2,700 meters. Montana to Washington (?), southward to Nevada and California.

4. **Gayophytum intermedium** Rydb. Bull. Torrey Club **31**: 569. 1904.

Moist ground in canyons and on slopes, upward to 2,800 meters. Montana to New Mexico, westward to Washington and California.

5. **Gayophytum ramosissimum** Torr. & Gray, Fl. N. Amer. **1**: 513. 1840.

Plains among sagebrush, canyons, and mountain sides, upward to 2,400 meters. Montana to New Mexico and California.

6. **Gayophytum nuttallii** Torr. & Gray, Fl. N. Amer. **1**: 514. 1840.

Plains and hillsides. South Dakota to Colorado and Arizona, westward to Washington and California.

7. **Gayophytum racemosum** Torr. & Gray, Fl. N. Amer. **1**: 514. 1840.

Canyons and mountain sides, upward to 2,700 meters. South Dakota to Colorado, westward to Washington and California.

8. **Gayophytum pumilum** S. Wats. Proc. Amer. Acad. **18**: 193. 1883.

Valleys and mountain sides; Sierra Nevada. Washington and Idaho, southward to Nevada and California.

17. GAURA L. Gaura

Leaves ovate-lanceolate to oblanceolate, the basal 10 cm. long or less; petals 3 to 4 mm. long; plant 50 to 150 cm. high, more or less silky-pilose. **1. G. parviflora.**

Leaves oblong or lanceolate to linear, 1 to 4 cm. long, entire or repand; petals 4 to 6 mm. long, commonly scarlet; plants more or less strigose or puberulent, 10 to 50 cm. high **2. G. coccinea.**

1. Gaura parviflora Dougl.; Hook. Fl. Bor. Amer. 1: 208. 1834.

Plains and foothills of the Covillea and artemisia belts. South Dakota to Washington, southward to Louisiana and Mexico.

2. Gaura coccinea Pursh, Fl. Amer. Sept. 733. 1814.

Plains and foothills of the Covillea and artemisia belts. Montana to Texas, Arizona, and Nevada.

18. CIRCAEA L. Enchanters-nightshade

1. Circaea pacifica Aschers. & Magn. Bot. Zeit. 29: 392. 1871.

Moist canyons and mountain meadows of the yellow pine, aspen, and spruce belts. Montana to Colorado, westward to British Columbia and California.

91. HALORAGIDACEAE. Watermilfoil Family

Annual or perennial aquatic herbs; leaves alternate or verticillate, mostly submerged; flowers perfect or monoecious, solitary, clustered, or in spikes; calyx adnate to the ovary, the limb entire or lobed; petals 2 to 4 and small, or none; stamens 1 or more; styles 1 to 4; ovary ovoid-oblong, ribbed or winged, 1 to 4-celled, with 1 ovule in each cell; fruit indehiscent, 1 to 4-celled.

Leaves (at least the submerged) pinnately dissected, the lobes filiform; flowers polygamous or monoecious, axillary or in terminal spikes; sepals and petals 2 to 4; stamens 4 or 8; styles 4; fruit 4-celled, 4-lobed. **1. MYRIOPHYLLUM.**

Leaves entire, linear, 1 to 3 cm. long, whorled; flowers perfect, axillary; sepals and petals none; stamen 1; style filiform; ovary 1, subtended by the stamen; fruit 1-celled, 4-seeded **2. HIPPURIS.**

1. MYRIOPHYLLUM L. Parrotfeather

1. Myriophyllum spicatum L. Sp. Pl. 992. 1753.

In still waters or slow streams of the artemisia, pinyon, yellow pine, and aspen belts. Newfoundland to Connecticut, New Mexico, and California; also in Europe and Asia.

2. HIPPURIS L. Marestail

1. Hippuris vulgaris L. Sp. Pl. 4. 1753.

In ponds and lakes of the artemisia belt, upward to 2,700 meters. Greenland to New York, New Mexico, and California; also in Europe and Asia.

92. APIACEAE. Carrot Family

Acaulescent or caulescent annuals or perennials with tuberous or elongate roots; leaves alternate, simple to ternately compound; petioles expanded or sheathing at base; flowers in simple or compound umbels, 5-merous; ovary inferior; styles 2; carpels 2, ribbed or winged; oil tubes mostly present in the walls of the carpels; fruit of 2 seedlike carpels (mericarps), these separating at maturity.

Leaves prevailingly simple (some leaves compound).
Leaves peltate or reniform, crenate, long-petioled; umbels simple, proliferous.
Flowers white; aquatic plant with low creeping stems.
1. HYDROCOTYLE.
Leaves neither peltate nor reniform; umbels compound.
Plants low, rarely 15 cm. high. Leaves pinnatifid to pinnate, with broad rounded segments or pinnae; bractlets of the involucels equaling the pedicels; involucre none----------**26. RHYSOPTERUS.**
Plants 20 to 200 cm. high or more.
Flowers yellow. Basal leaves cordate-ovate, crenate, the upper leaves compound; fruit ovate or oblong, glabrous; carpels with filiform ribs.
10. ZIZIA.
Flowers white.
Uppermost leaves linear to lanceolate----------**12. CARUM.**
Uppermost leaves broader.
Flowers in dense bracted heads. Bractlets spinulose, intermixed with the flowers; sepals rigid, persistent; fruit ovoid or oblong, scaly; leaves lanceolate, spinulous-serrate----**3. ERYNGIUM.**
Flowers in compound umbels. Villous perennial, 1 to 2 meters high; involucels of numerous bractlets; fruit broadly oblong, the carpels with lateral wings; leaves palmately lobed to pinnately 3-foliolate----------**33. HERACLEUM.**
Leaves prevailingly compound.
Fruit more or less spiny or bristly (glabrous in one species of *Osmorhiza*).
Bristles hooked, numerous. Perennials, 10 to 40 cm. high (in our species); leaves ternate or bipinnate, the divisions obovate, spinulose-toothed; flowers yellow; fruit in globular heads----------**2. SANICULA.**
Bristles present only on the ribs of the fruit.
Fruit linear-clavate. Perennials 30 to 90 cm. high, with thick aromatic roots; leaves bipinnate or ternately compound; leaflets ovate to lanceolate; flowers white or purple----------**4. OSMORHIZA.**
Fruit oblong or broader. Flowers white or pinkish; bractlets entire or toothed.
Calyx teeth prominent; stylopodium conic; pedicels very unequal; glabrous or sparingly hispid annual; leaves and bracts pinnately dissected; fruit 4 to 6 mm. long, armed with hooked bristles.
5. CAUCALIS.
Calyx teeth and stylopodium obsolete; pedicels nearly equal; bristly annuals or perennials; leaves pinnately decompound; fruit armed with barbed bristles----------**34. DAUCUS.**
Fruit neither spiny nor bristly. Involucral bracts simple or none.
Plants acaulescent or nearly so, or with leaves and peduncles borne at the summit of a short stem.
Leaves and peduncles clustered at the summit of the stem.
Involucre of more or less conspicuous hyaline bracts. Flowers purple or white; carpels oblong to orbicular, the ribs broad-winged; leaves once to thrice pinnate----------**22. PHELLOPTERUS.**
Involucre mostly wanting.
Bractlets of the involucels linear, small. Fruit oblong, the ribs mostly broad-winged; leaves pinnate to ternately decompound.
24. AULOSPERMUM.

Bractlets of the involucels equaling or exceeding the flowers.
Bractlets equaling the white flowers; fruit nearly orbicular, the carpels with 5 corky wings; leaves pinnatifid to pinnate; umbels usually solitary_____26. **RHYSOPTERUS.**
Bractlets exceeding the white or yellow flowers; fruit oval, the ribs filiform or winged; leaves pinnatifid to bipinnate. **25. CYMOPTERUS.**

Leaves and peduncles basal or nearly so.
Plants low, the stems slender.
Plant not cespitose, the roots tuberous or fusiform. Leaves once or twice ternate, the ultimate segments linear; involucel of few linear bractlets; flowers white; carpels flattened dorsally, the ribs filiform_____7. **OROGENIA.**
Plants cespitose.
Leaves pinnate, the leaflets long-linear; carpels oblong, the ribs not winged_____13. **DAUCOPHYLLUM.**
Leaves bipinnatifid, the ultimate segments short; carpels with thick, corky wings. Oil tubes 1 to 3 in the intervals. **19. OREOXIS.**

Plants robust, commonly cespitose.
Leaflets large, orbicular or ovate_____30. **COGSWELLIA.**
Leaflets or segments linear, or small and oblong.
Ultimate leaf segments long-linear or linear-oblong, 1 to 10 cm. long.
Leaves once or twice ternate; leaflets 3 to 10 cm. long. **30. COGSWELLIA.**
Leaves once or twice pinnate; leaflets less than 3 cm. long. **31. CYNOMARATHRUM.**
Ultimate leaf segments small, 1 cm. long or less.
Pinnules and segments crowded and overlapping.
Calyx teeth evident; ribs of fruit conspicuously winged. **23. PTERYXIA.**
Calyx teeth obsolete; only the lateral ribs conspicuously winged_____30. **COGSWELLIA.**
Pinnules and segments more or less distant.
Ribs of fruit all conspicuously winged____23. **PTERYXIA.**
Ribs of fruit not winged, the lateral conspicuously ribbed, the dorsal mostly filiform.
Calyx teeth and stylopodium obsolete__30. **COGSWELLIA.**
Calyx teeth evident.
Stylopodium wanting_____27. **PSEUDOCYMOPTERUS.**
Stylopodium present_____31. **CYNOMARATHRUM.**

Plants caulescent.
Inflorescence capitate and villous-tomentose. Flowers white or purplish; fruit cuneate-obovate, the carpels ribbed at base, winged above; leaves once or twice pinnate, the leaflets cuneate, ovate-lanceolate, serrate or incised_____17. **SPHENOSCIADIUM.**
Inflorescence commonly loose, if capitate not villous-tomentose.
Fruit linear or club-shaped, 12 mm. long or more. Leaves ternately decompound, the leaflets lanceolate, toothed__4. **OSMORHIZA.**

Fruit oblong or broader.
Leaves pinnate.
Leaves pinnately 3-foliolate.
Leaf blades crenate, cordate-ovate to lanceolate_____10. **ZIZIA.**
Leaf blades incisely toothed or lobed.
Leaflets cuneate-obovate. Flowers small, white; fruit oval, small, the ribs winged_____9. **APIUM.**
Leaflets round-cordate, sharply serrate or lobed, 6 to 15 cm. long. Plant tomentose-pubescent, often over 2 meters high_____33. **HERACLEUM.**
Leaves not pinnately 3-foliolate (except in *Apium graveolens*).
Flowers yellow. Fruit glabrous, oval, the lateral ribs winged; leaflets ovate, 2 to 10 cm. long, serrate or lobed.
32. PASTINACA.
Flowers white.
Pedicels and fruit hispid_____21. **ANGELICA.**
Pedicels and fruit glabrous.
Leaflets entire, linear or lanceolate_____12. **CARUM.**
Leaflets serrate or crenate-serrate.
Leaflets linear or lanceolate, serrate. Involucre of lanceolate scarious bracts; fruit flattened, ovate to oblong, the carpels with corky ribs_____15. **SIUM.**
Leaflets oblong or broadly elliptic.
Calyx teeth minute; fruit globose; leaflets sharply serrate_____16. **BERULA.**
Calyx teeth evident; fruit ovate; leaflets crenate-serrate_____28. **OXYPOLIS.**
Leaves ternate to pinnately or ternately decompound.
Plant a slender annual. Leaves of 2 forms, the lower often pinnate with rounded or cuneate-obovate toothed leaflets, the upper much dissected; flowers white, conspicuous; fruit globular, strongly ribbed_____6. **CORIANDRUM.**
Plants biennial or perennial.
Stems conspicuously purple-dotted. Leaves much dissected, the ultimate pinnules ovate, lobed or toothed; flowers white; fruit broadly ovate, the ribs wavy_____8. **CONIUM.**
Stems not conspicuously if at all purple-dotted.
Ultimate leaf segments long-linear or filiform. Flowers white or pink.
Involucre of broad scarious bracts, the involucel of lanceolate scarious bractlets; fruit ovate to linear-oblong, the carpels with filiform ribs_____14. **EULOPHUS.**
Involucre none; involucel of few to many bractlets; fruit orbicular or oblong, the carpels with filiform ribs.
12. CARUM.
Ultimate leaf segments broadly linear to ovate or cuneate-obovate.
Leaflets cuneate-obovate_____9. **APIUM.**
Leaflets not cuneate.
Plants slender, 20 to 30 cm. high. Leaf segments linear-oblong, 1 cm. long or less; flowers yellow.
27. PSEUDOCYMOPTERUS.

Plants stout, often cespitose.
Flowers yellow or purplish. Fruit elliptic-oblong, 8 to 20 mm. long, the lateral wings corky; leaves large, pinnately or ternately decompound.
29. LEPTOTAENIA.

Flowers white.
Fruit strongly flattened, the wings thin.
Leaves much dissected; fruit about 6 mm. long, glabrous——**20. CONIOSELINUM.**
Leaves ternately or pinnately compound, the ultimate segments ample; fruit glabrous or pubescent——**21. ANGELICA.**
Fruit not strongly flattened.
Roots with numerous horizontal cavities; leaves bipinnate; leaflets linear-lanceolate to lanceolate, remotely serrate; fruit oblong to orbicular, glabrous, the ribs corky; oil tubes solitary in the intervals——**11. CICUTA.**
Roots without horizontal cavities; leaves pinnate to twice ternate; fruit ovate to oblong, the carpels with prominent ribs; oil tubes 3 to 5 in the intervals——**18. LIGUSTICUM.**

1. HYDROCOTYLE L. Waterpenny

1. Hydrocotyle prolifera Kellogg, Proc. Calif, Acad. 1: 14. 1854.

In ditches within the Covillea belt. Central California to southern Nevada and Arizona.

2. SANICULA L.

Peduncles nearly basal——**1. S. nevadensis.**
Peduncles arising singly along the stem——**2. S. septentrionalis.**

1. Sanicula nevadensis S. Wats. Proc. Amer. Acad. 11: 139. 1876.

Rocky places of the yellow pine belt; Sierra Nevada. California and western (?) Nevada.

2. Sanicula septentrionalis Greene, Erythea 1: 6. 1893.

Dry hillsides and ridges of the pinyon and yellow pine belts. Montana to British Columbia, California, and western Nevada.

3. ERYNGIUM L. Eryngo

1. Eryngium articulatum Hook. Lond. Journ. Bot. 6: 232. 1847.

Wet meadows of the artemisia belt. Idaho and Washington, southward to California.

4. OSMORHIZA Raf. Sweetroot

Fruit glabrous, 12 to 16 mm. long, the ribs acute. Fruiting rays forming a compact cluster; stem and leaves puberulent——**1. O. occidentalis.**
Fruit with bristly ribs.
Leaflets obtuse or acutish, 2 to 4 cm. long, glabrous or nearly so; fruit obtuse——**2 O. obtusa.**
Leaflets acute or acuminate, becoming 6 cm. long; fruit with a distinct beak, 2 mm. long.

Foliage glabrous or nearly so; pedicels longer than the fruit.
3. O. divaricata.

Foliage strigose-pubescent; pedicels usually shorter than the fruit.
4. O. brevipes.

1. Osmorhiza occidentalis Nutt.; Torr. U. S. & Mex. Bound. Bot. 71. 1859.
Glycosma occidentalis Nutt.; Torr. & Gray, Fl. N. Amer. 1: 639. 1840.
Glycosma maxima Rydb. Bull. Torrey Club 40: 67. 1913.

Pinyon, yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to Colorado and California.

2. Osmorhiza obtusa (Coult. & Rose) Fernald, Rhodora 4: 154. 1902.
Washingtonia obtusa Coult. & Rose, Contr. U. S. Nat. Herb. 7: 64. 1900.

Yellow pine, aspen, spruce, and subalpine belts. Quebec to British Columbia, southward to New Mexico and California.

3. Osmorhiza divaricata Nutt.; Torr. & Gray, Fl. N. Amer. 1: 639. 1840.

Yellow pine, aspen, and spruce belts. Quebec to Alaska, southward to South Dakota, Utah, and California.

4. Osmorhiza brevipes (Coult. & Rose) Suksdorf, Allg. Bot. Zeit. 12: 5. 1906.
Washingtonia brevipes Coult. & Rose, Contr. U. S. Nat. Herb. 7: 66. 1900.

Canyons and mountain sides of the yellow pine, aspen, and spruce belts; Sierra Nevada and Sawtooth Mountains. Montana to British Columbia and southern California.

5. CAUCALIS L.

1. Caucalis microcarpa Hook. & Arn. Bot. Beechey Voy. 348. 1840.

Valleys and on hillsides of the Covillea and artemisia belts. Idaho and Washington to California, Arizona, and Mexico.

6. CORIANDRUM L. CORIANDER

1. Coriandrum sativum L. Sp. Pl. 256. 1753.

Waste places; Nevada. Introduced from southern Europe.

7. OROGENIA S. Wats.

Root rounded, deep-seated ..... 1. O. linearifolia.
Root elongate, fusiform ..... 2. O. fusiformis.

1. Orogenia linearifolia S. Wats. in King, Geol. Expl. 40th Par. 5: 120. *pl. 14, f. 1–3.* 1871.

Mountain sides of the yellow pine, aspen, and spruce belts. Colorado to Oregon and Washington.

2. Orogenia fusiformis S. Wats. Proc. Amer. Acad. 22: 474. 1887.

Yellow pine and aspen belts. Oregon and California to Utah.

8. CONIUM L.

1. Conium maculatum L. Sp. Pl. 243. 1753. POISONHEMLOCK.

Waste places; introduced from Europe.

9. APIUM L.

1. Apium graveolens L. Sp. Pl. 264. 1753. CELERY.

In cultivation and often escaped. This species, a native of Europe, is one of the most important economic plants of the family.

10. ZIZIA Koch

1. **Zizia cordata** (Walt.) Koch; DC. Prodr. 4: 100. 1830.
Smyrnium cordatum Walt. Fl. Carol. 114. 1788.
Pinyon, yellow pine, and aspen belts. New England to Georgia, Utah, Oregon, and British Columbia.

11. CICUTA L. WATERHEMLOCK

1. **Cicuta occidentalis** Greene, Pittonia 2: 7. 1889.
Wet and springy places of the artemisia, pinyon, and yellow pine belts South Dakota to New Mexico, westward to British Columbia and California.

12. CARUM L.

Leaves bipinnate to tripinnatifid, the ultimate segments linear. 1. C. carvi.
Leaves simple to pinnate (rarely bipinnate).
Leaves or leaflets linear—2. C. gairdneri.
Leaves or leaflets linear-lanceolate or oblanceolate—3. C. garrettii.

1. **Carum carvi** L. Sp. Pl. 263. 1753. CARAWAY.
In cultivation and often escaped. Native of Europe.

2. **Carum gairdneri** (Hook. & Arn.) A. Gray, Proc. Amer. Acad. 7: 344. 1867. YAMPA.
Atenia gairdneri Hook. & Arn. Bot. Beechey Voy. 349. 1840.
Mountain sides and canyons of the artemisia, pinyon, and yellow pine belts, Montana to Utah, westward to British Columbia and California. The roots are eaten by the Indians.

3. **Carum garrettii** A. Nels.; Coult. & Rose, Contr. U. S. Nat. Herb. 12: 443. 1909.
Yellow pine belt. Utah.

13. DAUCOPHYLLUM Rydb.

1. **Daucopyhllum lineare** Rydb. Bull. Torrey Club 40: 69. 1913.
Pinyon and yellow pine belts. Utah.

14. EULOPHUS Nutt.

1. **Eulophus bolanderi** (A. Gray) Coult. & Rose, Rev. Umbell. 112. 1888.
Dry gravelly hillsides of the artemisia, pinyon, and yellow pine belts. Oregon and California, eastward to Idaho and Utah.

15. SIUM L.

1. **Sium suave** Walt. Fl. Carol. 115. 1788.
Sium cicutaefolium Gmelin, Syst. 2: 482. 1791.
Wet and springy places of the pinyon, yellow pine, aspen, and spruce belts. Newfoundland to Virginia, westward to British Columbia and California.

16. BERULA Hoffm. WATERPARSNIP

1. **Berula erecta** (Huds.) Coville, Contr. U. S. Nat. Herb. 4: 115. 1893.
Sium erectum Huds. Fl. Angl. 103. 1762.
Swamps and springy places of the artemisia, pinyon, and yellow pine belts. Ontario to Illinois, westward to British Columbia and California.

17. SPHENOSCIADIUM A. Gray

1. Sphenosciadium capitellatum A. Gray, Proc. Amer. Acad. **6**: 537. 1865.

In meadows and along creeks of the artemisia, pinyon, and yellow pine belts. Oregon, Idaho, California, and Nevada.

18. LIGUSTICUM L.

Stem more or less leafy; leaves large, 2-ternate, then bipinnate.
- Ultimate leaf segments linear; involucel of few bractlets; inflorescence glabrous; fruit narrowly oblong, 6 to 7 mm. long ---- **1. L. filicinum.**
- Ultimate leaf segments lanceolate to lance-ovate, entire or toothed; involucels wanting; inflorescence glabrous or puberulent; fruit oblong-ovate, 6 to 7 mm. long ---- **2. L. porteri.**

Stem commonly with 1 leaf; leaves smaller, ternate, then once or twice pinnate. Inflorescence glabrous.
- Ultimate leaf segments narrowly linear, 1 to 2 mm. broad; involucels of 1 or 2 narrow bractlets ---- **5. L. tenuifolium.**
- Ultimate leaf segments commonly broader (if narrow, lanceolate); bractlets of involucels commonly more than 2.
  - Leaflets small, more or less crowded; rays 1 to 2 cm. long -- **3. L. grayi.**
  - Leaflets 1 to 2.5 cm. long, distant; rays 5 cm. long or more -- **4. L. cusickii.**

1. Ligusticum filicinum S. Wats. Proc. Amer. Acad. **11**: 140. 1876.

Yellow pine, aspen, and spruce belts. Utah, Wyoming, and Montana.

2. Ligusticum porteri Coult. & Rose, Rev. Umbell. 86. 1888.

Aspen, spruce, and subalpine belts. Wyoming to New Mexico, Arizona, and Utah.

3. Ligusticum grayi Coult. & Rose, Rev. Umbell. 88. 1888.

Aspen and spruce belts. Oregon, California, and Nevada.

4. Ligusticum cusickii Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 138. 1900.

Aspen and spruce belts. Oregon, California, and Nevada.

5. Ligusticum tenuifolium S. Wats. Proc. Amer. Acad. **14**: 293. 1879.

Aspen, spruce, and subalpine belts. Colorado to Idaho and Oregon.

19. OREOXIS Raf.

Plant puberulent; leaflets cleft into 1 to 7 oblong divisions. Flowers pale yellow or white; fruit 4 to 5 mm. long ---- **1. O. alpina.**

Plants glabrous (the inflorescence excepted); leaflets obovate, cleft into 3 to 7 oblong divisions.
- Bractlets obovate or oblanceolate; leaflets crowded ---- **2. O. bakeri.**
- Bractlets linear; leaflets rather distant ---- **3. O. macdougali.**

1. Oreoxis alpina (A. Gray) Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 144. 1900.

Cymopterus alpinus A. Gray, Amer. Journ. Sci. II. **33**: 408. 1862.

Spruce and alpine belts. Colorado and Utah.

2. Oreoxis bakeri Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 144. 1900.

Spruce and alpine belts. Colorado and eastern Utah.

3. Oreoxis macdougali (Coult. & Rose) Rydb. Bull. Torrey Club **40**: 68. 1913.

Aletes macdougali Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 107. 1900.

Canyons of the artemisia, pinyon, and yellow pine belts. Southern Utah and Arizona.

20. CONIOSELINUM Fisch.

1. Conioselinum scopulorum (A. Gray) Coult. & Rose, Contr. U. S. Nat. Herb. 7: 151. 1900.

Ligusticum scopulorum A. Gray, Proc. Amer. Acad. 7: 347. 1868.

Pinyon belt, upward to the subalpine belt. New Mexico and Arizona, northward to Colorado, Utah, and Oregon.

21. ANGELICA L. ANGELICA

Leaves once to twice pinnate.

Leaves (upper) pinnate; leaflets ovate to lanceolate, distantly serrate, 2.5 to 7.5 cm. long; fruit broadly ovate, hispid, 4 to 6 mm. long. **3. A. kingii.**

Leaves bipinnatifid to bipinnate; leaflets lanceolate, serrate, 2 to 5 cm. long; the lower with lateral basal lobes; fruit oblong, 4 to 6 mm. long, glabrous or nearly so ..... **1. A. pinnata.**

Leaves bipinnate to triternate.

Leaves bipinnate (the uppermost sometimes pinnate). Leaflets linear to broadly lanceolate, laciniately toothed or lobed to entire, 2.5 to 7 cm. long; fruit broadly oblong, 3 mm. long, glabrous ..... **6. A. leporina.**

Leaves once to thrice ternately compound.

Leaflets large, 5 to 12 cm. long or more.

Leaflets linear-lanceolate to oblong-lanceolate, acuminate, spinulose-serrate, the lowest sometimes lobed. Fruit oblong, 5 to 10 mm. long, pubescent or glabrate ..... **7. A. breweri.**

Leaflets ovate or obovate to lanceolate.

Fruit glabrous; leaflets ovate to lanceolate, acute, crenate-serrate. **2. A. lyallii.**

Fruit hirsute; leaflets obovate or ovate, sessile or nearly so, irregularly serrate ..... **4. A. dilatata.**

Leaflets smaller, 2.5 to 5 cm. long.

Plants puberulent throughout. Leaflets ovate-oblong, acute, incisely serrate; fruit broadly elliptic, 6 to 7 mm. long, pubescent. **8. A. wheeleri.**

Plants glabrous to the inflorescence.

Leaflets mostly oblong-lanceolate to linear-lanceolate, coarsely and unevenly serrate; fruit hispid ..... **3. A. kingii.**

Leaflets broadly ovate to lanceolate, laciniately toothed, teeth mucronate; fruit broadly oblong-elliptic, 4 to 5 mm. long, scabrous or smooth ..... **5. A. roseana.**

1. Angelica pinnata S. Wats. in King, Geol. Expl. 40th Par. 5: 126. 1871.

Pinyon belt, upward to the spruce belt. Montana to Utah, Colorado, and New Mexico.

2. Angelica lyallii S. Wats. Proc. Amer. Acad. 17: 374. 1882.

Draws and canyons along streams of the aspen and spruce belts. Washington and Oregon, eastward to Montana and Utah.

3. Angelica kingii (S. Wats.) Coult. & Rose, Contr. U. S. Nat. Herb. 7: 158. 1900.

Selinum kingii S. Wats. in King, Geol. Expl. 40th Par. 5: 126. 1871.

Wet places in the pinyon, yellow pine, and aspen belts. California to Idaho and Utah.

4. Angelica dilatata A. Nels.; Coult. & Rose, Contr. U. S. Nat. Herb. **12:** 446. 1909.

Near mountain streams in City Creek Canyon, Salt Lake City, Utah.

5. Angelica roseana Henderson, Contr. U. S. Nat. Herb. **5:** 201. *pl. 26.* 1899.

Spruce and subalpine belts; Uintah Mountains. Montana to Utah and Idaho.

6. Angelica leporina S. Wats. in Proc. Amer. Acad. **12:** 252. 1877.

Pinyon belt, upward to the spruce belt. Southern Utah and northern Arizona. Arizona.

7. Angelica breweri A. Gray, Proc. Amer. Acad. **7:** 348. 1868.

Aspen and spruce belts. California and Nevada.

8. Angelica wheeleri S. Wats. Amer. Nat. **7:** 301. 1873.

Artemisia and pinyon belts. Utah.

22. PHELLOPTERUS Nutt.

Involucre and involucels of conspicuous, 1 to 3-nerved bracts; fruit broadly oblong, 10 to 12 mm. long ..... **1. P. utahensis.**
Involucre a low hyaline sheath; involucels of conspicuous bractlets; fruit orbicular, 12 to 15 mm. long ..... **2. P. multinervatus.**

1. Phellopterus utahensis (Jones) Woot. & Standl. Contr. U. S. Nat. Herb. **16:** 158. 1913.

Cymopterus utahensis Jones, Proc. Calif. Acad. II. **5:** 684. 1895.

Plains and hillsides of the Covillea, artemisia, and pinyon belts. Idaho and Nevada to New Mexico.

2. Phellopterus multinervatus Coult. & Rose, Contr. U. S. Nat. Herb. **7:** 169. 1900.

Artemisia and pinyon belts. Southern Utah, Nevada, and California.

23. PTERYXIA Nutt.

Leaf outline narrow.
Pinnae distant; fruit oblong, 4 to 6 mm. long, wings half as broad as body or narrower ..... **1. P. petraea.**
Pinnae crowded; fruit oblong, 6 to 7 mm. long, wings narrow ..... **2. P. calcarea.**
Leaf outline broad. Ultimate leaf segments oblong, mucronate; fruit broadly oval, 6 to 7 mm. long, broad-winged ..... **3. P. foeniculacea.**

1. Pteryxia petraea (Jones) Coult. & Rose, Contr. U. S. Nat. Herb. **7:** 172 1900.

Cymopterus petraeus Jones, Contr. West. Bot. **8:** 32. 1898.

Foothills and mountain sides of the artemisia, pinyon, and yellow pine belts. Nevada and southeastern California to Idaho.

2. Pteryxia calcarea (Jones) Coult. & Rose, Contr. U. S. Nat. Herb. **7:** 173. 1900.

Cymopterus calcareus Jones, Contr. West. Bot. **8:** 32. 1898.

Canyons and mountain sides of the pinyon and yellow pine belts. Wyoming and Utah to Oregon and Nevada.

3. Pteryxia foeniculacea Nutt.; Torr. & Gray, Fl. N. Amer. **1:** 624. 1840.

Artemisia, pinyon, and yellow pine belts. Wyoming and Colorado, westward to Washington and California.

24. AULOSPERMUM Coult. & Rose

Leaves clustered at summit of an elongate stem.
  Plant scabro-puberulent. Ultimate leaf segments oblong, obtuse; flowers white ..... 2. A. watsoni.
  Plants glabrous and glaucous.
    Ultimate leaf segments oval, mucronate, crowded and overlapping; flowers yellow ..... 1. A. longipes.
    Ultimate leaf segments oblong, obtuse, crowded; flowers white. ..... 3. A. ibapense.
Leaves clustered at base near the ground, the ultimate segments spinulose-tipped. Flowers purple or yellowish.
  Leaves pinnate, the pinnae lobed or nearly divided. Ultimate segments triangular-obovate, apiculate.
    Leaf outline ovate to ovate-oblong; flowers pediceled ..... 4. A. rosei.
    Leaf outline reniform to cordate-oblong; flowers sessile ..... 5. A. basalticum.
  Leaves ternately bipinnatifid or bipinnate.
    Flowers yellow. Primary leaf divisions pinnatifid, the ultimate segments cuneate-obovate, entire or coarsely toothed; fruit about 10 mm. long; oil tubes 4 to 6 in the intervals ..... 6. A. duchesnense.
    Flowers purple.
      Ultimate leaf segments obovate-oblong, entire or toothed, the teeth spinulose; oil tubes solitary in the intervals; plant glaucous. ..... 7. A. jonesii.
      Ultimate leaf segments obovate, mostly toothed, the teeth short and broad, mucronate; plants green ..... 8. A. purpureum.

1. **Aulospermum longipes** (S. Wats.) Coult. & Rose, Contr. U. S. Nat. Herb. 7: 175. 1900.
   Cymopterus longipes S. Wats. in King, Geol. Expl. 40th Par. 5: 124. 1871.
   Foothills and canyons of the artemisia, pinyon, and yellow pine belts, Wyoming and Idaho to Colorado and Utah.

2. **Aulospermum watsoni** Coult. & Rose, Contr. U. S. Nat. Herb. 7: 176. 1900.
   Cymopterus glaucus S. Wats. in King, Geol. Expl. 40th Par. 5: 124. 1871. Not *C. glaucus* Nutt.
   Pinyon and yellow pine belts. Nevada.

3. **Aulospermum ibapense** (Jones) Coult. & Rose, Contr. U. S. Nat. Herb 7: 176. 1900.
   Cymopterus ibapense Jones, Zoe 3: 302. 1893.
   Foothills and canyons of the artemisia and pinyon belts. Utah and Nevada.

4. **Aulospermum rosei** Jones; Coult. & Rose, Contr. U. S. Nat. Herb. 7: 179. 1900.
   Plains and slopes of the artemisia and pinyon belts. Utah.

5. **Aulospermum basalticum** (Jones) Tidestrom.
   Cymopterus basalticus Jones, Contr. West. Bot. 12: 16. 1908.
   Pinyon belt. Utah.

6. **Aulospermum duchesnense** (Jones) Tidestrom.
   Cymopterus duchesnensis Jones, Contr. West. Bot. 13: 12. 1910.
   Artemisia belt. Utah.

7. **Aulospermum jonesii** Coult. & Rose, Contr. U. S. Nat. Herb. 7: 178. 1900.
   Pinyon and yellow pine belts. Utah.

8. Aulospermum purpureum (S. Wats.) Coult. & Rose, Contr. U. S. Nat. Herb. 7: 178. 1900.

Cymopterus purpureus S. Wats. Amer. Nat. 7: 300. 1873.

Plains and foothills of the artemisia, pinyon, and yellow pine belts. Colorado, New Mexico, Utah, and Arizona.

25. CYMOPTERUS Raf.

Umbels in globose heads. Flowers white; fruiting heads 2 to 3 cm. in diameter; fruit obovate, 6 to 8 mm. long; leaves once or twice pinnate.
- Leaf segments narrowly oblong, the ultimate segments narrow, acutish. **1. C. megacephalus.**
- Leaf segments broadly oblong, pinnatifid, the ultimate segments broad, cuspidate---------- **2. C. globosus.**

Umbels more or less open.
- Flowers white. Leaves once or twice pinnate, the ultimate segments ovate-oblong, mucronate, often crowded and overlapping; fruit oblong, 6 to 7 mm. long----------**5. C. lapidosus.**
- Flowers yellow. Bracts of involucel foliaceous.
  - Leaves pinnately 3 to 5-foliolate, the pinnae broad, incisely lobed, the lobes broad and rounded; fruit broadly elliptic, about 8 mm. long. **4. C. newberryi.**
  - Leaves two or three times pinnatifid, the pinnae 5 or 7, oblong, the ultimate segments broadly linear to oblong; fruit oblong, 6 to 10 mm. long. **3. C. fendleri.**

1. Cymopterus megacephalus Jones, Zoe 2: 14. 1891.

On plains. Northern Arizona and Nevada.

2. Cymopterus globosus S. Wats. Proc. Amer. Acad. 11: 141. 1876.

Cymopterus montanus globosus S. Wats. in King, Geol. Expl. 40th Par. 5: 124. 1871.

Valleys and foothills of the artemisia, pinyon, and yellow pine belts. Nevada and eastern California.

3. Cymopterus fendleri A. Gray, Mem. Amer. Acad. n. ser. 4: 56. 1849.

Cymopterus decipiens Jones, Zoe 2: 246. 1891.

Plains and foothills of the artemisia and pinyon belts. Colorado, New Mexico, and Utah.

4. Cymopterus newberryi (S. Wats.) Jones, Zoe 4: 47. 1893.

Peucedanum newberryi S. Wats. Amer. Nat. 7: 301. 1873.

Cymopterus newberryi alatus Jones, Zoe 4: 47. 1893.

Plains and foothills of the artemisia and pinyon belts. Colorado, New Mexico, Utah, and northern Arizona.

5. Cymopterus lapidosus Jones, Contr. West. Bot. 8: 31. 1898.

Canyons and hillsides of the pinyon and yellow pine belts. Northern Utah and Wyoming.

26. RHYSOPTERUS Coult. & Rose

Primary leaf segments 3, the terminal 3-lobed----------**1. R. jonesii.**
Primary leaf segments 5, the basal pair largest----------**2. R. corrugatus.**

1. Rhysopterus jonesii Coult. & Rose, Contr. U. S. Nat. Herb. 7: 186. 1900.

Artemisia, pinyon, and yellow pine belts. Utah.

2. **Rhysopterus corrugatus** (Jones) Coult. & Rose, Contr. U. S. Nat. Herb. 7: 187. 1900.
Cymopterus corrugatus Jones, Amer. Nat. 17: 973. 1883.
Valleys and plains of the artemisia belt. Nevada.

27. PSEUDOCYMOPTERUS Coult. & Rose

Plants caulescent. Pinnae ovate, 1 to 3 cm. long, pinnatifid or incisely lobed, the lobes linear; fruit 4 to 5 mm. long.
Flowers purple——1. P. purpureus.
Flowers yellow——2. P. montanus.
Plants acaulescent or nearly so.
Leaves on short petioles; pinnae ovate, 1 to 2 cm. long, deeply pinnatifid, very short-pointed; plants 10 to 25 cm. high——3. P. tidestromii.
Leaves on long petioles; ultimate leaf segments rigid, sharp-pointed; plants densely cespitose, 20 to 40 cm. high.
Ultimate leaf segments 5 mm. long or less——4. P. anisatus.
Ultimate leaf segments 5 to 8 mm. long——4a. P. anisatus longilobus.

1. **Pseudocymopterus purpureus** (Coult. & Rose) Rydb. Bull. Torrey Club 33: 147. 1906.
Pseudocymopterus montanus purpureus Coult. & Rose, Rev. Umbell. 75. 1888.
Pseudocymopterus versicolor Rydb. Fl. Rocky Mount. 623. 1917.
Aspen, spruce, and subalpine belts. Central Utah and Arizona.

2. **Pseudocymopterus montanus** (A. Gray) Coult. & Rose, Rev. Umbell. 74. 1888.
Thaspium montanum A. Gray, Mem. Amer. Acad. n. ser. 4: 57. 1849.
Spruce and subalpine belts. Wyoming to Arizona and New Mexico.

3. **Pseudocymopterus tidestromii** Coult. & Rose, Contr. U. S. Nat. Herb. 12: 447. 1909.
Aspen, spruce, and subalpine belts. Utah.

4. **Pseudocymopterus anisatus** (A. Gray) Coult. & Rose, Rev. Umbell. 75, 1888.
Cymopterus (?) *anisatus* Gray, Proc. Acad. Phila. 1862: 63. 1863.
Spruce and subalpine belts. Wyoming and Colorado, westward to Nevada.

4a. **Pseudocymopterus anisatus longilobus** (Rydb.) Tidestrom.
Pseudopteryxia longiloba Rydb. Bull. Torrey Club 40: 72. 1913.
Spruce and subalpine belts. Utah.

28. OXYPOLIS Raf.

1. **Oxypolis fendleri** (A. Gray) Heller, Bull. Torrey Club 24: 478. 1897.
Archemora fendleri A. Gray, Mem. Amer. Acad. n. ser. 4: 56. 1849.
Spruce belt; Abajo Mountains, Utah. Wyoming to New Mexico and eastern Utah.

29. LEPTOTAENIA Nutt.

Umbels many-rayed, commonly with 12 or more rays; pedicels of the fruit 6 to 24 mm. long; fruit 8 to 12 mm. long——1. L. multifida.
Umbels few-rayed; pedicels of fruit 8 to 12 mm. long; fruit 16 to 18 mm. long, very flat and thin——2. L. eatoni.

1. Leptotaenia multifida Nutt. in Torr. & Gray, Fl. N. Amer. 1: 630. 1840.

INDIAN-BALSAM.

Foothills of the pinyon and yellow pine belts. Montana to Arizona, westward to Washington and California.

2. Leptotaenia eatoni Coult. & Rose, Rev. Umbell. 52. 1888.

Foothills and mountain sides of the pinyon, yellow pine, and aspen belts. Wyoming, Idaho, and Utah.

30. COGSWELLIA Raf.

Plants low, 10 to 30 cm. high, from globose tubers. Leaves biternate or dissected; ultimate leaf segments linear, elongate; flowers yellow; fruit narrowly winged.

Involucels wanting; pedicels 4 to 8 mm. long. Fruit 6 to 8 mm. long, 2 mm. broad; leaf segments broadly linear ---------- 1. C. ambigua.

Involucels present. Fruit sessile or nearly so.

Ultimate leaf segments elongate-linear, pointed; fruit linear, 9 to 10 mm. long, 2 mm. broad ---------- 2. C. leptocarpa.

Ultimate leaf segments short-linear, 12 mm. long or less, obtuse; fruit elliptic-oblong, 6 to 8 mm. long, 3 mm. broad ---------- 3. C. circumdata.

Plants stout, from more or less thickened roots.

Peduncle stout, sometimes much swollen at the top. Leaflets ovate to orbicular, cuneate to cordate, entire or toothed, 1 to 3 cm. long; fruit ovate to oblong, 8 mm. long ---------- 16. C. platyphylla.

Peduncle slender, never swollen at top.

Bractlets of involucel conspicuous, sometimes united at base. Flowers white; leaves ternate to pinnately decompound.

Bractlets more or less villous. Ultimate divisions of the leaflets ovate to short-linear; fruit linear-oblong or oblong, 6 to 20 mm. long. 4. C. macrocarpa.

Bractlets glabrous or puberulent, scarious-margined. Leaves grayish-pilose.

Leaves bipinnate, the ultimate leaf segments oblong, entire or toothed; fruit glabrous, oval, 5 mm. long ---------- 5. C. orientalis.

Leaves pinnately decompound, the ultimate leaf segments small, oblong; fruit oval to ovate, 6 to 10 mm. long, puberulent, the wings nearly as broad as the body ---------- 6. C. nevadensis.

Bractlets of involucel small or wanting.

Leaves merely once to thrice ternate. Leaflets or ultimate leaf segments linear to linear-lanceolate; flowers yellow.

Fruit broadly oblong to orbicular, 6 to 12 mm. long, 4 to 10 mm. broad, the wings broader than the body ---------- 7. C. simplex.

Fruit narrowly oblong, 6 to 12 mm. long, 3 to 4 mm. broad, the wings narrow ---------- 8. C. triternata.

Leaves much dissected.

Leaves glabrous throughout or nearly so.

Ultimate leaf segments very short, linear to filiform; fruit oblong, 8 to 16 mm. long, the wings more than half as broad as the body ---------- 9. C. grayi.

Ultimate leaf segments filiform; fruit linear-oblong, 10 to 12 mm. long, the wings very narrow ---------- 15. C. bicolor.

Leaves pubescent throughout.
Ovary and usually the fruit pubescent. Flowers yellow or purple.
Leaves persistently short-hirsute; fruit elliptic, somewhat pubescent, 6 to 10 mm. long, the wings half as broad as the body. **10. C. macdougali.**
Leaves persistently short-villous; fruit elliptic or broadly-oblong, pubescent, 8 mm. long, the wings more than half as broad as the body **11. C. jonesii.**
Ovary and fruit mostly glabrous.
Flowers white; leaves pinnate. Leaflets pinnatifid or entire, the ultimate leaf segments oblong-linear, cuspidate; fruit broadly oblong, 7 to 12 mm. long **12. C. parishii.**
Flowers yellow; leaves ternately compound.
Umbels 8 to 14-rayed; ultimate leaf segments short, linear; fruit elliptic, 8 mm. long **14. C. sonnei.**
Umbels with about 20 rays; ultimate leaf segments linear to lanceolate, acute; fruit elliptic, 6 to 8 mm. long. **13. C. juniperina.**

1. Cogswellia ambigua (Nutt.) Jones, Contr. West. Bot. **12**: 33. 1908.
Eulophus ambiguus Nutt. Journ. Acad. Phila. **7**: 27. 1834.
Foothills and ridges, upward to the yellow pine belt. British Columbia to Oregon, Utah, and Montana.

2. Cogswellia leptocarpa (Torr. & Gray) Jones, Contr. West. Bot. **12**: 33. 1908.
Peucedanum triternatum leptocarpum Torr. & Gray, Fl. N. Amer. **1**: 626. 1840.
Pinyon, yellow pine, and aspen belts. Oregon and northern California to Colorado.

3. Cogswellia circumdata (S. Wats.) Jones, Contr. West. Bot. **12**: 33. 1908.
Peucedanum circumdatum S. Wats. Proc. Amer. Acad. **22**: 474. 1887.
Humboldt National Forest, at 1,800 to 2,000 meters. Washington to Idaho, eastern Oregon, and Nevada.

4. Cogswellia macrocarpa (Nutt.) Jones, Contr. West. Bot. **12**: 33. 1908.
Peucedanum macrocarpum Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 627. 1840.
Foothills and canyons of the artemisia, pinyon, and yellow pine belts. British Columbia to California, eastward to Montana and Nevada.

5. Cogswellia orientalis (Coult. & Rose) Jones, Contr. West. Bot. **12**: 33. 1908.
Lomatium orientale Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 220. 1900.
Plains and foothills of the artemisia, pinyon, and yellow pine belts. South Dakota to Kansas, westward to Idaho and Arizona.

6. Cogswellia nevadensis (S. Wats.) Jones, Contr. West. Bot. **12**. 33. 1908.
Peucedanum nevadense S. Wats. Proc. Amer. Acad. **11**: 143. 1876.
Hillsides and canyons of the artemisia and pinyon belts. Utah and Arizona to Oregon and California.

7. Cogswellia simplex (Nutt.) Jones, Bull. Univ. Montana Biol. Ser. **15**: 41. 1910.
Peucedanum simplex Nutt.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 129. 1871.
Plains and foothills of the artemisia, pinyon, and yellow pine belts. Montana to Colorado, Oregon, and Washington.

8. Cogswellia triternata (Pursh) Jones, Contr. West. Bot. **12**: 32. 1908.
Seseli triternatum Pursh, Fl. Amer. Sept. 197. 1814.
Yellow pine belt. British Columbia to northeastern California, Nevada, and Wyoming.

9. Cogswellia grayi Coult. & Rose, Contr. U. S. Nat. Herb. **12**: 450. 1909.
Peucedanum millefolium S. Wats. in King, Geol. Expl. 40th Par. **5**: 129. 1871. Not *P. millefolium* Sonder, 1861–1862.
Plains and foothills of the artemisia, pinyon, and yellow pine belts. Wyoming and Colorado to Utah and Washington.

10. Cogswellia macdougali (Coult. & Rose) Jones, Contr. West. Bot. **12**: 34. 1908.
Lomatium macdougali Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 233. 1900.
Plains and mountain sides of the pinyon, yellow pine, and aspen belts. Utah, Nevada, and northern Arizona.

11. Cogswellia jonesii (Coult. & Rose) Jones, Contr. West. Bot. **12**: 34. 1908.
Lomatium jonesii Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 233. 1900.
Canyons and mountain sides, upward to the aspen belt. Utah and Idaho to Alberta.

12. Cogswellia parishii Coult. & Rose, Contr. U. S. Nat. Herb. **12**: 450. 1909.
Peucedanum parishii Coult. & Rose, Bot. Gaz. **13**: 209. 1888.
Foothills of the artemisia, pinyon, and yellow pine belts. Southern Nevada and adjacent California.

13. Cogswellia juniperina Jones, Contr. West. Bot. **12**: 34. 1908.
Pinyon belt. Utah and adjacent Wyoming.

14. Cogswellia sonnei (Coult. & Rose) Jones, Contr. West. Bot. **12**: 34. 1908.
Lomatium sonnei Court. & Rose, Contr. U. S. Nat. Herb. **7**: 236, 1900.
Artemisia belt. Nevada and California.

15. Cogswellia bicolor (S. Wats.) Jones, Contr. West. Bot. **12**: 33. 1908.
Peucedanum bicolor S. Wats. in King, Geol. Expl. 40th Par. **5**: 129. 1871.
Pinyon and yellow pine belts. Utah, Wyoming, and Idaho.

16. Cogswellia platyphylla Coult. & Rose, Contr. U. S. Nat. Herb. **12**: 450. 1909.
Peucedanum latifolium Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 625. 1840. Not *P. latifolium* DC. 1830.
Plains and foothills of the artemisia, pinyon, and yellow pine belts. Washington, Oregon, and northern Nevada.

31. CYNOMARATHRUM Nutt.

Foliage scabrous; leaves lanceolate, bipinnate. Ultimate leaf segments ovate-oblong, apiculate; fruit elliptic, 7 to 9 mm. long ..... **4. C. scabrum.**
Foliage glabrous or nearly so; leaves once or twice pinnate.
Ultimate leaf segments (or leaflets) elongate-linear.
Umbels 4 to 20-rayed; pedicels 2 to 6 mm. long; fruit oblong, 8 to 10 mm. long ..... **1. C. nuttallii.**
Umbels 3 to 6-rayed; pedicels 8 to 16 mm. long; fruit linear-oblong, 4 to 7 mm. long ..... **2. C. alpinum.**
Ultimate leaf segments short, linear or lanceolate.
Ultimate leaf segments linear, about 5 mm. long ..... **5. C. parryi.**
Ultimate leaf segments lanceolate, about 10 mm. long ..... **3. C. latilobum.**

1. Cynomarathrum nuttallii (A. Gray) Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 245. 1900.

Seseli nuttallii A. Gray, Proc. Amer. Acad. **8**: 287. 1870.

Spruce and subalpine belts. Nebraska and Wyoming to Utah and northwestern New Mexico.

2. Cynomarathrum alpinum (S. Wats.) Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 245. 1900.

Peucedanum graveolens alpinum S. Wats. in King, Geol. Expl. 40th Par. **5**: 129. 1871.

Rocky slopes of the pinyon, yellow pine, and aspen belts. Nevada.

3. Cynomarathrum latilobum Rydb. Bull. Torrey Club **40**: 73. 1913.

Artemisia and pinyon belts. Utah.

4. Cynomarathrum scabrum Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 247. 1900.

Pinyon and yellow pine belts. Utah.

5. Cynomarathrum parryi (S. Wats.) Coult. & Rose, Contr. U. S. Nat. Herb. **7**: 246. 1900.

Peucedanum parryi S. Wats. Proc. Amer. Acad. **11**: 143. 1876.

Peucedanum scopulorum Jones, Contr. West. Bot. **8**: 31. 1898.

Plains and foothills of the Covillea, artemisia, and pinyon belts. Utah, Nevada, and California.

32. PASTINACA L.

1. Pastinaca sativa L. Sp. Pl. 262. 1753. PARSNIP.

Along irrigating ditches and fences; introduced from Europe.

33. HERACLEUM L. COW-PARSNIP

1. Heracleum lanatum Michx. Fl. Bor. Amer. **1**: 166. 1803.

Pinyon belt, upward to the spruce belt. New England to Alaska, southward to North Carolina, New Mexico, and California.

34. DAUCUS L. CARROT

Ultimate leaf segments ovate or lanceolate, cuspidate; rays 6 cm. long or less. Central flower in the umbel commonly purple_____**1. D. carota.**

Ultimate leaf segments linear; rays short, rarely over 3.5 cm. long. **2. D. pusillus.**

1. Daucus carota L. Sp. Pl. 242. 1753.

Waste places; California. Introduced from the Old World and naturalized in many places throughout the United States.

2. Daucus pusillus Michx. Fl. Bor. Amer. **1**: 164. 1803.

Covillea and artemisia belts. South Carolina to Florida, California, and Washington.

93. CORNACEAE. Dogwood Family

Trees, shrubs (in our species), or low perennials; leaves mostly opposite, estipulate; flowers perfect or dioecious, in heads, cymes, or ament-like spikes, 4 or 5-merous; calyx adnate to the ovary, the limb dentate or entire; petals and stamens inserted on an epigynous disk; ovary inferior, 1 or 2-celled; styles 1 or 2; fruit a 1 or 2-celled, 1 or 2-seeded drupe.

Leaves evergreen, coriaceous, entire, ovate to oblong, 3 to 7 cm. long, the petioles connate at base; flowers dioecious, bracted, in spikes; petals none; fruit grayish-pubescent ..... 1. GARRYA.
Leaves deciduous, not coriaceous, 3 to 12 cm. the petioles not connate at base; flowers perfect, in cymes; petals small, white; fruit white. 2. CORNUS.

1. GARRYA A. Gray. Silktassel-bush

1. Garrya flavescens S. Wats. Amer. Nat. 7: 301. 1873.

Hillsides and canyons of the Covillea, artemisia, and pinyon belts. Southern Utah, Nevada, Arizona, and southeastern California.

2. CORNUS L. Dogwood

Young branches and inflorescence more or less villous; leaves oval or ovate, strigose above, villous beneath ..... 1. C. occidentalis.
Young branches and inflorescence strigose; leaves oval or elliptic, strigose. 2. C. stolonifera.

1. Cornus occidentalis (Torr. & Gray) Coville, Contr. U. S. Nat. Herb. 4: 117. 1893.

Cornus sericea occidentalis Torr. & Gray, Fl. N. Amer. 1: 652. 1840.

Along brooks in the yellow pine and aspen belts. British Columbia to Nevada and northern California.

2. Cornus stolonifera Michx. Fl. Amer. 1: 92. 1803.

Cornus instolonea A. Nels. Bot. Gaz. 53: 224. 1912.

Along brooks in the yellow pine, aspen, and spruce belts. Alaska to Montana, southward to Nevada, Arizona, and Nebraska.

94. PYROLACEAE. Shinleaf Family

Low herbaceous perennials from slender rootstocks; leaves evergreen; flowers regular; calyx deeply 5-cleft, free from the ovary; corolla commonly of 5 concave petals; stamens commonly 10; anthers opening by a pore at the inverted base; style 1; ovary 5-celled, with central placenta, the ovules numerous; capsule subglobose, loculicidal.

Flowers corymbose or in umbels, white or pinkish. Stem leafy; leaves (in our species) cuneate-oblanceolate, serrate, 2 to 3 cm. long. 1. CHIMAPHILA.
Flowers solitary or in racemes.
  Flowers solitary, white or rose-colored. Leaves orbicular or nearly so, serrulate; style straight; stigma large, peltate ..... 2. MONESES.
  Flowers in racemes, greenish, whitish, or purplish. Leaves commonly basal. 3. PYROLA.

1. CHIMAPHILA Pursh. Pipsissewa

1. Chimaphila umbellata occidentalis (Rydb.) Blake, Rhodora 19: 242. 1917.

Chimaphila occidentalis Rydb. N. Amer. Fl. 29: 30. 1914.

Aspen, spruce, and subalpine belts. British Columbia to Colorado, Utah, and California.

2. MONESES Salisb.

1. Moneses uniflora (L.) A. Gray, Man. 273. 1848. Woodnymph.

Pyrola uniflora L. Sp. Pl. 397. 1753.

Spruce and alpine belts. Labrador to Alaska, southward to Pennsylvania, New Mexico, and Oregon.

3. PYROLA L. Shinleaf

Style straight.
  Flowers secund, greenish white; style long, exserted; leaves ovate. 1. P. secunda.
  Flowers not secund, white or rose-colered; style short, included; leaves orbicular, slightly crenulate 2. P. minor.
Style and stamens declined.
  Leaves mottled, coriaceous, broadly ovate to oblong, entire, the blade 2 to 4 cm. long. Petals greenish white 3. P. picta.
  Leaves not mottled.
    Leaf blades narrowly obovate or elliptic, entire or distantly toothed, 2 cm. long or more. Flowers greenish 4. P. pallida.
    Leaf blades broadly elliptic to orbicular, the petioles equaling or longer than the blades.
      Calyx lobes short, obtuse or acutish; flowers greenish white. Leaf blades oval or obovate, 2 to 3 cm. long 5. P. chlorantha.
      Calyx-lobes triangular-ovate, acute or acuminate; flowers pink or purple.
        Leaves broadly oval to orbicular, usually longer than broad, crenulate. 6. P. uliginosa.
        Leaves reniform to orbicular, usually broader than long, crenulate. 7. P. asarifolia.

1. Pyrola secunda L. Sp. Pl. 396. 1753.

Damp places in the aspen, spruce, and alpine belts. Labrador to Alaska, southward to Virginia and California; also in northern Europe and Asia.

2. Pyrola minor L. Sp. Pl. 396. 1753.

Spruce and alpine belts. Greenland to Alaska, southward to Connecticut, Colorado, and California.

3. Pyrola picta J. E. Smith, Rees's Cycl. **29**: no. 8. 1819.

Aspen and spruce belts. Wyoming to New Mexico, westward to British Columbia and California.

4. Pyrola pallida Greene, Pittonia **4**: 39. 1899.

Mountain sides of the yellow pine and aspen belts; Sierra Nevada. Oregon, California, and western Nevada.

5. Pyrola chlorantha Swartz, Svensk. Vet. Akad. Handl. **1810**: 190. *pl. 5.* 1810.

Spruce and alpine belts. Labrador to Virginia, westward to British Columbia and California; also in Europe.

6. Pyrola uliginosa Torr. Fl. N. Y. **1**: 453. *pl. 69.* 1843.

Bogs in the aspen, spruce, and alpine belts. Newfoundland to Alaska, southward to New England, Colorado, and California.

7. Pyrola asarifolia Michx. Fl. Bor. Amer. **1**: 251. 1803.

Aspen and spruce belts. New Brunswick to New York, New Mexico, and British Columbia.

95. MONOTROPACEAE. Indianpipe Family

Fleshy parasitic or saprophytic herbs with reddish stems; leaves reduced to scales; flowers solitary or racemose; sepal 2 to 6; petals free or corolla gamopetalous; stamens 5 or more; style 1; ovary superior, commonly 4 to 6-celled, many-ovuled; placentae projecting from a central column; capsule 4 to 6-celled, many-seeded.

Flowers solitary, white (black in drying), nodding, polypetalous. Stems clustered, 10 to 20 cm. high; sepals 2 to 4, ovate-oblong; style short; stigma funnelform; capsule ovoid----------1. **MONOTROPA.**

Flowers racemose.

Corolla polypetalous, 12 mm. long or less. Stems clustered, 10 to 30 cm. high, pubescent above; flowers 3 to 5-merous, 12 mm. long or less, glandular or pubescent; style exserted; stigma glandular or hairy; capsule globular or oval----------2. **HYPOPITYS.**

Corolla gamopetalous. Stems purplish or red, pubescent or glandular-pubescent, 30 cm. high or more.

Corolla globular-ovate; stamens 10; style short; stigma 5-lobed; capsule depressed-globular; inflorescence long and slender, 3 cm. or less in diameter----------3. **PTEROSPORA.**

Corolla campanulate; stamens 5; style exserted; capsule 5-celled; inflorescence sometimes 6 cm. in diameter----------4. **SARCODES.**

1. **MONOTROPA** L. INDIANPIPE

1. Monotropa uniflora L. Sp. Pl. 387. 1753.

Moist places of the aspen belt; Idaho and Oregon. Labrador to Alaska, southward to Florida and Mexico.

2. **HYPOPITYS** Adans. PINESAP

1. Hypopitys latisquama Rydb. Bull. Torrey Club **40**: 461. 1913.

Coniferous forests. Montana to New Mexico, westward to British Columbia and California.

3. **PTEROSPORA** Nutt. PINEDROPS

1. Pterospora andromedea Nutt. Gen. Pl. **1**: 269. 1818.

Yellow pine, aspen, and spruce belts. Quebec to Pennsylvania, New Mexico, and California.

4. **SARCODES** Torr. SNOWPLANT

1. Sarcodes sanguinea Torr. Pl. Frem. 17. *pl. 10*. 1850.

Valleys and foothills of the yellow pine and aspen belts. Nevada and California.

96. ERICACEAE. Heath Family

Perennial herbs or shrubs (in our species); leaves simple, estipulate; flowers perfect; calyx of 4 to 10 distinct or partially united sepals; corolla of distinct or united petals; stamens as many or twice as many as the sepals, hypogynous; anthers 2-celled, often appendaged; ovary superior, 2 to 5-celled; styles united; stigma capitate or peltate; fruit a capsule, berry, or drupe.

Leaves of a narrow linear type or minute and imbricate. Heatherlike shrubs, 30 cm. high or less.

Leaves narrowly linear, 5 to 20 mm. long. Flowers in an umbelliform terminal cluster; corolla campanulate or rotate, deeply lobed; plant more or less glandular----------3. **PHYLLODOCE.**

Leaves minute, ovate to lanceolate, 6 mm. long or less, 4-ranked, crowded, ciliolate. Flowers axillary, on slender pedicels; calyx glabrous; corolla campanulate, white or pink----------4. **CASSIOPE.**

Leaves oblong or broader. Trailing or erect shrubs.

Leaves resinous-dotted beneath, elliptic to ovate, 5 cm. long or less. Flowers in terminal corymbs; calyx lobes ovate, obtuse; petals 5, distinct, orbicular or nearly so, 5 to 8 mm. long----------1. **LEDUM.**

Leaves not resinous-dotted beneath.
Leaves glaucescent beneath, ovate to obovate, 2 cm. long or less, revolute.
Inflorescence corymbose; calyx lobes ovate, obtuse; corolla commonly rose-purple, rotate or nearly so; fruit a subglobose capsule. **2. KALMIA.**
Leaves green on both sides. Fruit a berry or drupe.
Corolla (in our species) campanulate, white, 3 to 4 mm. long. Leaves orbicular or nearly so, 2 cm. long or less; undershrubs (ours), 20 cm. high or less **5. GAULTHERIA.**
Corolla urn-shaped. Shrub with red, shreddy or smooth bark and coriaceous leaves **6. ARCTOSTAPHYLOS.**

1. LEDUM L. Labrador-tea

1. Ledum glandulosum Nutt. Trans. Amer. Phil. Soc. II. **8**: 270. 1843.
Canyons and mountain sides of the spruce and subalpine belts. Alberta and British Columbia to Wyoming, Utah, and California.

2. KALMIA L. Kalmia

1. Kalmia microphylla (Hook.) Heller, Bull. Torrey Club **25**: 581. 1898.
Kalmia glauca microphylla Hook. Fl. Bor. Amer. **2**: 41. 1834.
Spruce belt. Alaska to Colorado, northern Utah, and California.

3. PHYLLODOCE Salisb. Mountain-heather

Corolla lobes equaling the tube; filaments much longer than the anthers; leaves 2 cm. long or less **1. P. breweri.**
Corolla tube twice longer than the lobes; filaments somewhat longer than the anthers; leaves 1.5 cm. long or less **2. P. empetriformis.**

1. Phyllodoce breweri (A. Gray) Heller, Muhlenbergia **1**: 1. 1900.
Bryanthus breweri A. Gray, Proc. Amer. Acad. **7**: 367. 1868.
Subalpine belt; Sierra Nevada. California and western Nevada.

2. Phyllodoce empetriformis (J. E. Smith) Don, Edinburgh New Phil. Journ. **17**: 160. 1834.
Menziesia empetriformis J. E. Smith, Trans. Linn. Soc. **10**: 380. 1811.
Ridges in the aspen and spruce belts. British Columbia to Wyoming, northeastern Utah (?), and California.

4. CASSIOPE Don

1. Cassiope mertensiana (Bong.) Don, Hist. Dichl. Pl. **3**: 829. 1834.
Andromeda mertensiana Bong. Mém. Acad. St. Pétersb. VI. **2**: 152. 1832.
Ridges and mountain sides of the spruce belt; Sierra Nevada. Alaska to California and western Nevada.

5. GAULTHERIA L.

1. Gaultheria humifusa (Graham) Rydb. Mem. N. Y. Bot. Gard. **1**: 300. 1900.
Vaccinium humifusum Graham, Edinburgh New Phil. Journ. **1831**: 193. 1831.
Mountain sides and canyons of the aspen, spruce, and subalpine belts. British Columbia to Colorado and California.

6. ARCTOSTAPHYLOS Adans.

Trailing shrubs. Leaves spatulate to obovate, 2 cm. long or less; inflorescence racemose, short, dense; flowers white or pink.
Leaves with rounded apex; corolla 4 to 6 mm. long; fruit globose, red. **1. A. uva-ursi.**

Leaves mucronate; corolla 7 to 8 mm. long; fruit depressed-globose, brown. **2. A. nevadensis.**

Plants erect shrubs, 1 to 4 meters high. Flowers about 7 mm. long; fruit 6 to 8 mm. in diameter.

Flowers commonly in simple dense racemes; leaves elliptic to oblanceolate, 15 mm. wide or less, grayish-tomentose when young, sparingly puberulent in age **3. A. pungens.**

Flowers commonly in panicles; leaves ovate to orbicular, 6 cm. long or less, rounded or acute; twigs and petioles more or less puberulent. **4. A. platyphylla.**

1. Arctostaphylos uva-ursi (L.) Spreng. Syst. Veg. **2**: 287. 1825. BEARBERRY.

Arbutus uva-ursi L. Sp. Pl. 395. 1753.

Dry mountain sides and yellow pine areas, upward to the spruce belt. Arctic region to New Mexico and California; also in Europe and Asia.

2. Arctostaphylos nevadensis A. Gray, Syn. Fl. **2**[1]: 27. 1878.

SIERRA BEARBERRY.

Rocky canyons and mountain sides of the yellow pine and spruce belts; Sierra Nevada. Washington to Califoria and western Nevada.

3. Arctostaphylos pungens H. B. K. Nov. Gen. & Sp. **3**: 278. *pl. 259.* 1818.

MANZANITA.

Canyons and mountain sides, at 1,000 meters or more; southern Utah and Nevada. Utah to California, southward to Mexico.

4. Arctostaphylos platyphylla (A. Gray) Kuntze, Rev. Gen. Pl. **2**: 385. 1891.

Arctostaphylos glauca S. Wats. in King, Geol. Expl. 40th Par. **5**: 210. 1871. Not *A. glauca* Lindl. 1835.

Arctostaphylos pungens platyphylla A. Gray, Syn. Fl. **2**[1]: 28. 1878.

Forming dense colonies in the pinyon, yellow pine, and aspen belts. Colorado to California.

97. VACCINIACEAE. Blueberry Family

Low shrubs; leaves simple, alternate, estipulate; flowers perfect, solitary or clustered; calyx 4 or 5-lobed, gamosepalous; corolla gamopetalous, mostly urceolate in our genus, 4 or 5-lobed; stamens twice as many as the corolla lobes, the anthers 2-awned; ovary inferior, 4 or 5-celled; style filiform, the stigma simple or 4 or 5-lobed; fruit a berry.

1. VACCINIUM L.

Branches not angular. Shrub, 0.2 to 1 meter high; leaves obovate-oblong, 1 to 2 cm. long; berry blue, glaucous, 4 to 5 mm. in diameter. **1. V. occidentale.**

Branches angular.

Leaves serrate.

Leaves 1 to 1.5 cm. long, oval to ovate, acute; berry 5 to 8 mm. in diameter. Undershrub **2. V. oreophilum.**

Leaves 2 to 5 cm. long, broadly elliptic to ovate-oblong; berry 8 to 10 mm. in diameter **3. V. membranaceum.**

Leaves crenulate to subentire. Corolla nearly white.

Leaves 1 to 4 cm. long, obovate to broadly oval; berry purplish blue, 6 to 8 mm. in diameter; shrub, 30 to 80 cm. high **4. V. globulare.**

Leaves commonly 1 cm. long or less, ovate-lanceolate to ovate; berry red, 5 mm. in diameter; undershrub **5. V. scoparium.**

1. Vaccinium occidentale A. Gray; Brewer & Wats. Bot. Calif. 1: 451. 1876.

WESTERN BOG BLUEBERRY.

Yellow pine, aspen, and spruce belts. Montana and British Columbia, southward to Utah and California.

2. Vaccinium oreophilum Rydb. Bull. Torrey Club 33: 148. 1906.

ROCKY MOUNTAIN WHORTLEBERRY.

Spruce and subalpine belts. Alberta and British Columbia to New Mexico.

3. Vaccinium membranaceum Dougl.; Torr. in Wilkes, U. S. Expl. Exped. 17: 377. 1874.

BIG WHORTLEBERRY.

Vaccinium myrtilloides macrophylla Hook. Fl. Bor. Amer. 2: 32. 1834.
Vaccinium macrophyllum Piper, Contr. U. S. Nat. Herb. 11: 443. 1906.

Yellow pine, aspen, and spruce belts; Wyoming. Michigan to British Columbia and California.

4. Vaccinium globulare Rydb. Mem. N. Y. Bot. Gard. 1: 300. 1900.

Yellow pine, aspen, and spruce belts; Uintah Mountains, Utah. Montana to Utah, Oregon, and British Columbia.

5. Vaccinium scoparium Leiberg, Mazama 1: 196. 1897.

GROUSE WHORTLEBERRY.

Yellow pine, aspen, spruce, and subalpine belts. British Columbia to California, and Colorado.

98. PRIMULACEAE. Primrose Family

Mostly low annuals or perennials; leaves simple, opposite, alternate, whorled, or basal, estipulate; flowers perfect, usually regular; calyx gamosepalous, 4 to 9-lobed, persistent; corolla gamopetalous; stamens inserted on the tube of the corolla (or on the calyx tube, when the corolla is wanting), as many as the corolla lobes and opposite them; ovary 1-celled, the placenta central; fruit a 2 to 8-valved or circumscissile capsule.

Plants scapose.
- Corolla lobes reflexed. Filaments often more or less united; flowers umbellate, purple, rose, or white ..... **8. DODECATHEON.**
- Corolla lobes erect or spreading. Flowers umbellate.
  - Corolla rotate, conspicuous; perennials ..... **1. PRIMULA.**
  - Corolla salverform or funnelform, inconspicuous; small annuals (except *A. carinata*, a perennial) ..... **2. ANDROSACE.**

Plants with leafy stems.
- Flowers in terminal racemes or panicles. Stem 10 to 60 cm. high; leaves alternate, ovate or obovate, obtuse, 3 to 10 cm. long; corolla small, white; capsule short, 5-valved ..... **3. SAMOLUS.**
- Flowers axillary, solitary.
  - Peduncles elongate, 1 to 5 cm. long.
    - Plants annual, with 4-angled stem 5 to 30 cm. long; leaves opposite, ovate, entire, sessile or clasping; flowers red, pink, or white, 5 to 7 mm. broad ..... **6. ANAGALLIS.**
    - Plants perennial, 30 to 120 cm. high, erect; leaves ovate or lanceolate, entire, acute or acuminate, long-petioled, 5 to 15 cm. long; corolla yellow, 15 mm. broad or more; capsule valvate ..... **4. STEIRONEMA.**
  - Peduncles very short.
    - Corolla wanting; leaves opposite, entire, oval to linear-oblong, 4 to 10 mm. long; capsule 5-valved ..... **5. GLAUX.**
    - Corolla present, shorter than the calyx; leaves alternate, or opposite below, obovate or oblong, 4 to 8 mm. long; capsule circumscissile. **7. CENTUNCULUS.**

1. PRIMULA L. PRIMROSE

Leaves coarsely toothed around the apex, cuneate-obovate, thickish, crowded on a ligneous stem. Flowers purple; corolla lobes equaling the tube. **5. P. suffrutescens.**

Leaves entire or finely toothed.

Plants stout, 10 to 30 cm. high; leaves oblanceolate or spatulate-oblong, entire. Corolla crimson-purple, the tube equaling the calyx, the lobes obovate, emarginate, about 10 mm. long **1. P. parryi.**

Plants slender, 5 to 20 cm. high; leaves oblong, lanceolate, or spatulate-oblong, 2 to 8 cm. long, gradually contracted at base. Scapes 5 to 20 cm. high.

Leaves entire, spatulate-oblong, 3 to 10 cm. long. Corolla violet (rarely white), 10 mm. long; calyx green, with a conspicuous white line down the sinuses **4. P. cusickiana.**

Leaves sinuate-dentate.

Leaves more or less white-mealy beneath; corolla lilac, the lobes obcordate, about 3 mm. long **2. P. incana.**

Leaves slightly mealy when young, glabrate in age; corolla dark-violet, the yellow tube 8 to 10 mm. long, the lobes cuneate, emarginate, short **3. P. specuicola.**

1. Primula parryi A. Gray, Amer. Journ. Sci. II. **34**: 257. 1862.
Primula mucronata Greene, Pittonia **3**: 251. 1897.
Spruce and alpine belts. Colorado and New Mexico to Nevada and Arizona.

2. Primula incana Jones, Proc. Calif. Acad. II. **5**: 706. 1895.
Aspen belt. Saskatchewan and Alberta to Colorado and Utah.

3. Primula specuicola Rydb. Bull. Torrey Club **40**: 461. 1901.
Canyons under overhanging cliffs. Southeastern Utah.

4. Primula cusickiana A. Gray, Syn. Fl. **2**: 399. 1886.
Rocky hillsides at 1,200 to 2,100 meters. Eastern Oregon, northern Nevada, and Idaho.

5. Primula suffrutescens A. Gray, Proc. Amer. Acad. **7**: 371. 1868.
Wet rocky slopes; Lake Tahoe region. California and western Nevada.

2. ANDROSACE L.

Plant cespitose, perennial, 1 to 10 cm. high. Leaves crowded, oblanceolate, 4 to 6 mm. long, acute, ciliate; flower subcapitate; corolla small, white or yellow, with yellow eye **1. A. carinata.**

Plants scapose annuals.

Bracts of involucre ovate or oblong, obtuse or acute. Leaves oblanceolate or spatulate, 3 to 15 mm. long, puberulent; corolla shorter than the calyx. **2. A. occidentalis**

Bracts of involucre lanceolate or subulate.

Corolla exceeding the calyx.

Calyx tube hemispheric in fruit, the teeth broadly triangular; leaves ovate-lanceolate, dentate; plants glabrous **6. A. filiformis.**

Calyx tube obpyramidal in fruit, the teeth lanceolate; leaves oblanceolate, entire or denticulate; plants more or less puberulent. **3. A. subumbellata.**

Corolla and capsule shorter than the calyx; leaves oblanceolate, entire or denticulate, puberulent.

Pedicels and calyx lobes glabrous or nearly so **4. A. diffusa.**

Pedicels and calyx lobes puberulent **5. A. puberulenta.**

1. Androsace carinata Torr. Ann. Lyc. N. Y. **1**: 30. *pl. 3, f. 1.* 1824.
Alpine belt. Alberta to New Mexico and Utah.

2. Androsace occidentalis Pursh, Fl. Amer. Sept. 137. 1814.
Androsace simplex Rydb. Bull. Torrey Club **40**: 462. 1913.
Valleys and hillsides, upward to the aspen belt. Manitoba to Missouri and Texas, westward to British Columbia and California.

3. Androsace subumbellata (A. Nels.) Small, Bull. Torrey Club **25**: 319. 1898.
Androsace septentrionalis subumbellata A. Nels. Wyo. Agr. Exp. Sta. Bull. 28: 149. 1896.
Aspen, spruce, and alpine belts. Hudson Bay to British Columbia, southward to New Mexico and Arizona.

4. Androsace diffusa Small, Bull. Torrey Club **25**: 318. 1898.
Aspen and spruce belts. Mackenzie to British Columbia, southward to New Mexico and Arizona.

5. Androsace puberulenta Rydb. Bull. Torrey Club **30**: 260. 1903.
Aspen and spruce belts. Saskatchewan to Alaska, southward to New Mexico and Arizona.

6. Androsace filiformis Retz. Obs. Bot. **2**: 10. 1781.
Aspen and spruce belts; Yellowstone Park. Washington to Colorado and northeastern Utah(?); also in Europe.

3. SAMOLUS L. Brookweed

1. Samolus floribundus H. B. K. Nov. Gen. & Sp. **2**: 224. 1817.
Wet places of the artemisia belt. Newfoundland to British Columbia, southward to Florida, California, and Mexico.

4. STEIRONEMA Raf. Loosestrife

1. Steironema ciliatum (L.) Raf. Ann. Gén. Phys. **7**: 192. 1820.
Lysimachia ciliata L. Sp. Pl. 147. 1753.
Pinyon, yellow pine, and aspen belts. Nova Scotia to British Columbia, southward to Georgia and Arizona.

5. GLAUX L.

1. Glaux maritima L. Sp. Pl. 207. 1753.
Moist alkaline meadows of the Great Basin. Newfoundland to Alaska, southward to New Jersey, Colorado, and Oregon; also in Europe and Asia.

6. ANAGALLIS L. Pimpernel

1. Anagallis arvensis L. Sp. Pl. 148. 1753.
Waste places throughout North America; introduced from Europe.

7. CENTUNCULUS L.

1. Centunculus minimus L. Sp. Pl. 116. 1753.
Wet meadows and along ponds; Idaho. Minnesota to British Columbia, southward to Florida, Texas, and South America; also in Europe.

8. DODECATHEON L. Shootingstar

Leaves ovate or oval, undulate-toothed, long-petioled. Corolla lobes white, 10 mm. long or less; filaments free; capsule twice longer than the calyx; plants 10 to 30 cm. high ..... **2. D. dentatum.**

Leaves commonly entire or, if toothed, narrow.
Filaments united into a yellow tube.
Leaves ovate to elliptic-oblong, more or less abruptly narrowed to the petiole; plants 10 to 30 cm. high, 1 to 8-flowered____1. D. pauciflorum.
Leaves oblong or narrow-lanceolate, tapering to the petiole; plants 5 to 20 cm. high, 1 to few-flowered_____3. D. watsoni.
Filaments free or nearly so, black.
Flowers normally tetramerous; leaves linear-oblanceolate, 10 cm. long or less, the slender scape twice longer; capsule circumscissile.
4. D. tetrandrum.
Flowers normally pentamerous; leaves linear-oblong to oblanceolate; calyx exceeding the valvate capsule.
Umbels few-flowered; plants 10 to 30 cm. high; leaves 3 to 15 cm. long.
5. D. alpinum.
Umbels many-flowered; plants 30 to 60 cm. high; leaves 10 to 30 cm. long_____6. D. jeffreyi.

1. **Dodecatheon pauciflorum** (Durand) Greene, Pittonia **2**: 72. 1890.
Dodecatheon meadia pauciflorum Durand, Journ. Acad. Phila. II. **3**: 95. 1855.
Dodecatheon salinum A. Nels. Bull. Torrey Club **28**: 227. 1901.
Meadows and sunny slopes at 1,800 to 3,000 meters. Saskatchewan to British Columbia, southward to Colorado and California.

2. **Dodecatheon dentatum** Hook. Fl. Bor. Amer. **2**: 119. 1838.
Spruce and subalpine belts. British Columbia to Oregon and Utah.

3. **Dodecatheon watsoni** Tidestrom, Proc. Biol. Soc. Washington **36**: 183. 1923.
Spruce belt; East Humboldt Mountains, Nevada.

4. **Dodecatheon tetrandrum** Suksdorf, Erythea **3**: 40. 1895.
Along creeks in canyons, at 1,500 to 2,100 meters or more; western Nevada. Washington to northern California and Nevada.

5. **Dodecatheon alpinum** (A. Gray) Greene, Erythea **3**: 39. 1895.
Dodecatheon media alpinum A. Gray, Bot. Calif. **1**: 467. 1876.
Aspen, spruce, and alpine belts. California and Oregon, eastward to Utah.

6. **Dodecatheon jeffreyi** Van Houtte, Serr. Jard. **16**: 99. 1867.
Canyons and mountain sides of the aspen and spruce belts. British Columbia to California, Idaho, and Nevada.

99. PLUMBAGINACEAE. Leadwort Family

Mostly acaulescent perennials; leaves (in our species) tufted, oblanceolate, long-petioled, 10 to 20 cm. long; inflorescence paniculate; flowers 5-merous; calyx gamosepalous, 5-toothed; corolla of 5 nearly distinct petals; stamens free or nearly so, inserted opposite the corolla-lobes; ovary superior, 1-celled, 1-ovuled; fruit a utricle; seed solitary.

1. LIMONIUM Mill. SEA-LAVENDER

1. **Limonium californicum** (Boiss.) Heller, Cat. N. Amer. Pl. 6. 1898.
Statice californica Boiss. in DC. Prodr. **12**: 643. 1848.
Along creeks and in washes; Vegas Wash, Nevada. Southern Nevada and California.

100. OLEACEAE. Olive Family

Trees, shrubs, or undershrubs with opposite or alternate, simple or compound, estipulate leaves; flowers polygamous, dioecious, or perfect, apetalous or gamopetalous; stamens 2 to 4; fruit a 1 or 2-celled capsule, drupe, or samara.

Leaves opposite, compound, or simple and very broad. Flowers paniculate; fruit a winged samara_____1. **FRAXINUS.**
Leaves simple, oblanceolate to spatulate-oblong.
Leaves opposite, spatulate-oblong to oblanceolate, obtuse or acute, 1 to 4 cm. long; flowers polygamo-dioecious, from axillary buds; fruit a black oblong drupe; shrub, 2 meters high or more_____2. **FORESTIERA.**
Leaves opposite or alternate, linear-spatulate or lanceolate, 1 to 3 cm. long; flowers terminating the branches or sometimes corymbose; corolla yellow; fruit a didymous membranaceous circumscissile capsule.
3. MENODORA.

1. FRAXINUS L. Ash

Leaves simple, ovate, rotund, cordate or obcordate, mostly entire (sometimes with 2 or 3 leaflets). Flowers polygamous; fruit winged from base to apex, 15 to 20 mm. long; shrub or low tree_____1. **F. anomala.**
Leaves 3-foliolate or pinnate.
Leaflets glabrous, glandular-punctate, obovate to lanceolate, entire or serrulate, 1 to 3 cm. long; flowers polygamous or perfect; calyx and corolla deeply 4-cleft; fruit linear-oblong, winged above the middle.
2 F. macropetala.
Leaflets velvety-pubescent to glabrate, not glandular-punctuate, lanceolate to oval or obovate, entire or serrate; flowers dioecious, small; fruit winged above, emarginate, about 15 mm. long_____3. **F. coriacea.**

1. **Fraxinus anomala** Torr.; S. Wats. in King, Geol. Expl. 40th Par. 5: 283. 1871. Singleleaf ash.

Canyons and rocky hillsides of the upper Covillea, artemisia, and pinyon belts. Southwestern Colorado and northwestern New Mexico, westward to Nevada.

2. **Fraxinus macropetala** Eastw. Bull. Torrey Club 30: 494. 1903.

Rocky slopes, upward to 2,100 meters. Northwestern Arizona.

3. **Fraxinus coriacea** S. Wats. Amer. Nat. 7: 302. 1873.

Along creeks and in low places of the Covillea and artemisia belts. Southwestern Utah, Arizona, and southern California.

2. FORESTIERA Poir.

1. **Forestiera neomexicana** A. Gray, Proc. Amer. Acad. 12: 63. 1876.

River valleys and canyons, upward to 2,100 meters. Colorado to central Utah, southward to western Texas and California.

3. MENODORA H. B. K.

Plants spinescent, diffusely branching shrubs; corolla funnelform, the lobes oblong. Branches olive-brown, pubescent_____1. **M. spinescens.**
Plants unarmed shrubs with more or less fastigiate branches; corolla nearly rotate.
Plants glabrous or nearly so; calyx 5 or 6-lobed_____2. **M. scoparia.**
Plants puberulent; calyx 7 to 15-lobed_____3. **M. scabra.**

1. **Menodora spinescens** A. Gray, Proc. Amer. Acad. 7: 388. 1868. Greenfire.

Plains and hillsides of the Covillea and artemisia belts, upward to 1,800 meters. Southern Nevada and adjacent California.

2. **Menodora scoparia** Engelm.; Brewer & Wats. Bot. Calif. 1: 471. 1876.

Mesas and gravelly hillsides of the Covillea belt. Southeastern California and southern Nevada, southward to Mexico.

3. Menodora scabra A. Gray, Amer. Journ. Sci. II. **14**: 44. 1852.

Plains and hillsides of the Covillea, artemisia, and pinyon belts. Western Texas to southern Utah, southward to Mexico.

101. LOGANIACEAE. Logania Family

Herbs, shrubs (in our species), or trees, with simple, opposite or verticillate, linear and densely tomentose, estipulate leaves; flowers regular, 4 or 5-merous, in capitate clusters; calyx 4 or 5-toothed, campanulate; corolla rotate-campanulate; ovary 2-celled; styles 2, united; ovules solitary; capsule 2-celled, septicidal.

1. BUDDLEIA L. Butterflybush

1. Buddleia utahensis Coville, Proc. Biol. Soc. Washington **7**: 69. 1892.

Plains and rocky hillsides of the Covillea and artemisia belts. Southwestern Utah to Nevada and southward.

102. GENTIANACEAE. Gentian Family

Herbs with opposite, verticillate, or occasionally alternate, simple, entire, estipulate leaves; flowers regular, perfect; calyx of 2 to 5 more or less united sepals; corolla gamopetalous, 4 or 5-lobed; stamens as many as the corolla lobes and alternate with them; style simple or none; ovary superior, 1-celled, with 2 parietal placentae; fruit a capsule; seeds numerous.

Corolla salverform to tubular-campanulate.
  Style filiform, deciduous; corolla red to pink, with yellowish tube; anthers twisted after anthesis. Leaves linear to oblong or lanceolate. **1. CENTAURIUM.**
  Style short, stout, persistent, or none; corolla variously colored; anthers straight ---------- **2. GENTIANA.**
Corolla rotate, with 1 or 2 nectariferous glands or scales adnate to each lobe.
  Calyx 4 or 5-parted; inflorescence thyrsoid or paniculate; perennials with taproots.
    Style evident; leaves opposite or verticillate ---------- **3. FRASERA.**
    Style very short or wanting; leaves opposite or some of them alternate. **4. SWERTIA.**

1. CENTAURIUM Hill. Centaurium

Corolla lobes oval or oblong, obtuse, 8 to 12 mm. long, little shorter than the tube; anthers linear; stems angled, 20 to 40 cm. high; basal leaves spatulate ---------- **1. C. arizonicum.**
Corolla lobes 4 to 6 mm. long, half as long as the tube or nearly so; anthers oblong; slender plants, 30 cm. high or less; leaves oblong to linear.
  Corolla lobes about 4 mm. long, oblong, obtuse ---------- **2. C. exaltatum.**
  Corolla lobes about 6 mm. long, ovate, acute ---------- **3. C. nuttallii.**

1. Centaurium arizonicum (A. Gray) Heller, Muhlenbergia **4**: 86. 1908.

Erythraea calycosa arizonica A. Gray, Syn. Fl. **2**[1]: 113. 1878.

River bottoms and canyons of the Covillea belt. Arizona, southern Utah, and Nevada.

2. Centaurium exaltatum (Griseb.) W. F. Wight, Contr. U. S. Nat. Herb. **11**: 449. 1906.

Cicendia exaltata Griseb. in Hook. Fl. Bor. Amer. **2**: 69. 1838.

Erythraea douglasii A. Gray in Brewer & Wats. Bot. Calif. **1**: 480. 1876.

Wet meadows and along creeks of the artemisia and pinyon belts. Washington to California and Utah.

3. Centaurium nuttallii (S. Wats.) Heller, Muhlenbergia **4**: 86. 1908.
Erythraea nuttallii S. Wats. in King, Geol. Expl. 40th Par. **5**: 276. *pl. 29.* 1871, in part.

Wet meadows and along creeks of the artemisia and pinyon belts. Idaho, Utah, and Nevada.

2. GENTIANA L. GENTIAN

Corolla lobes toothed or fringed; flowers 4-merous, large, sky-blue. Corolla campanulate-funnelform. (ANTHOPOGON.)

Flowers subtended by 2 bracts. Corolla lobes fringed below, erose above; leaves oblanceolate, obtuse; plants 5 to 15 cm. high__**1. G. barbellata.**

Flowers without subtending bracts. Plants 10 to 40 cm. high.

Corolla 3 to 5 cm. long, the lobes dentate above, fimbrillate on the sides; leaves spatulate-obovate to oblong, obtuse_____**2. G. elegans.**

Corolla 2.5 to 3 cm. long, the lobes entire or merely erose-denticulate above; basal leaves obovate.

Leaves linear to linear-lanceolate, mostly callous-pointed; peduncles comparatively long_____**3. G. holopetala.**

Leaves linear-oblong to spatulate, obtuse; peduncle half as long as the height of the plant or less_____**4. G. simplex.**

Corolla lobes entire (rarely toothed); flowers 4 or 5-merous.

Corolla without plaits, lobes, or teeth at the sinuses. (AMARELLA.)

Peduncles elongate and naked, 1-flowered, Corolla blue, 5 to 10 mm. long, with a fimbriate crown at the throat; low annual with small oblong leaves_____**5. G. monantha.**

Peduncles short or none, terminal or lateral, few to many-flowered. Stems elongated.

Calyx lobes very unequal. Corolla with numerous bristles at the throat; annual, 20 to 30 cm. high, with spatulate to lanceolate leaves.
6. G. heterosepala.

Calyx lobes equal or nearly so.

Stem leaves linear or linear-lanceolate. Corolla yellowish, about 10 mm. long, bristly at the throat; low annual with spreading branches_____**7. G. tortuosa.**

Stem leaves lanceolate or broader.

Flowers numerous, crowded, short-pediceled, greenish yellow to white, the lobes blue; setae in the throat few; leaves usually equaling the internodes_____**8. G. strictiflora.**

Flowers few, distinctly pediceled, blue or greenish yellow, the lobes blue; setae in the throat numerous; leaves usually much shorter than the internodes.

Calyx lobes linear, 10 to 12 mm. long; stem leaves lanceolate, acute or acuminate_____**9. G. scopulorum.**

Calyx lobes linear, 3 to 7 mm. long; stem leaves oblong to lanceolate, mostly obtuse_____**10. G. plebeia.**

Corolla with plaits, lobes, or teeth at the sinuses.

Plant small, annual or biennial. Leaves opposite, imbricate, scarious-margined; flowers solitary, terminal; corolla salverform, light greenish purple; capsule stipitate, exserted. (CHONDROPHYLLA.)
11. G. fremontii.

Plants perennial; leaves opposite, not imbricate; flowers cymose, sessile or nearly so. (DASYSTEPHANA.)

Corolla yellowish white, purple-dotted, funnelform, 3 to 3.5 cm. long. Plant 12 cm. high or less, with linear-oblong glabrous leaves.
12. G. romanzovii.

Corolla blue, purple, or white, not purple-dotted. Plants 10 to 40 cm. high.
Floral leaves narrow, the lower stem leaves ovate, oblong, or lanceolate. Corolla blue or purple.
Calyx lobes minute or none; corolla 2 to 2.5 cm. long. **15. G. forwoodii.**
Calyx lobes prominent, linear to linear-lanceolate; corolla 2.5 to 3.5 long---------- **16. G. affinis.**
Floral leaves ovate, those of the stem varying to oblong-lanceolate.
Corolla 3 to 4 cm. long.
Calyx lobes ovate, obtuse---------- **14. G. calycosa.**
Calyx lobes linear or lanceolate.
Corolla bright blue; calyx lobes half as long as the tube. **13. G. parryi.**
Corolla purple; calyx lobes nearly equaling the tube. **17. G. oregana.**

1. Gentiana barbellata Engelm. Trans. Acad. St. Louis **2**: 216. 1863.

Rocky places of the aspen, spruce, and alpine belts. Wyoming to New Mexico, Utah(?), and Arizona.

2. Gentiana elegans A. Nels. Bull. Torrey Club **25**: 276. 1898.

Mountain meadows and canyons of the aspen, spruce, and subalpine belts. Mackenzie to Idaho, Nevada, and Arizona.

3. Gentiana holopetala (A. Gray) Holm, Ottawa Nat. **15**: 110. 1901.
Gentiana serrata holopetala A. Gray, Syn. Fl. **2**[1]: 117. 1878.

Wet meadows; Sierra Nevada. California, Oregon, and western Nevada.

4. Gentiana simplex A. Gray, U. S. Rep. Exp. Miss. Pacif. **6**: 87. *pl. 16.* 1857.

Wet meadows; Sierra Nevada. California, Oregon, and western Nevada.

5. Gentiana monantha A. Nels. Bull. Torrey Club **31**: 244. 1904.

Aspen, spruce, and alpine belts. Idaho to Colorado, Utah, and Arizona.

6. Gentiana heterosepala Engelm. Trans. Acad. St. Louis **2**: 215. *pl. 8.* 1863.

Aspen, spruce, and alpine belts. Colorado, New Mexico, and Utah.

7. Gentiana tortuosa Jones, Proc. Calif. Acad. II. **5**: 707. 1895.

Aspen belt; Panguitch Lake, Utah.

8. Gentiana strictiflora (Rydb.) A. Nels. Bot. Gaz. **34**: 26. 1902.
Gentiana acuta strictiflora Rydb. Mem. N. Y. Bot. Gard. **1**: 309. 1900.

Meadows and slopes of the aspen, spruce, and alpine belts. Saskatchewan to Alaska, southward to New Mexico and California.

9. Gentiana scopulorum (Greene) Tidestrom.
Amarella scopulorum Greene, Leaflets **1**: 55. 1904.

Aspen, spruce, and alpine belts. North Dakota to Montana, Arizona, and New Mexico.

10. Gentiana plebeia Cham. Linnaea **1**: 181. 1826.

Aspen and spruce belts, Saskatchewan to Alaska, southward to Colorado and California; also in Asia.

11. Gentiana fremontii Torr. in Frém. Rep. Exped. Rocky Mount. 94. 1845.

Spruce and alpine belts. Wyoming to New Mexico and Utah.

12. Gentiana romanzovii Ledeb. Nouv. Mém. Soc. Nat. Moscou **1**: 215. *pl. 1.* 1829.

Spruce and alpine belts. Alaska to Montana, Colorado, and Utah.

13. Gentiana parryi Engelm. Trans. Acad. St. Louis **2**: 218. 1863.
Spruce and alpine belts. Wyoming to New Mexico, Utah, and Nevada.

14. Gentiana calycosa Griseb. in Hook. Fl. Bor. Amer. **2**: 58. 1838.
Spruce and alpine belts. Washington to Wyoming, Nevada, and California.

15. Gentiana forwoodii A. Gray, Proc. Amer. Acad. **19**: 86. 1883.
Aspen and spruce belts. Alberta to Colorado, Utah, and Idaho.

16. Gentiana affinis Griseb. in Hook. Fl. Bor. Amer. **2**: 56. 1838.
Meadows, canyons, and mountain sides of the artemisia belt, upward to 3,000 meters or more. Saskatchewan to British Columbia, southward to Colorado and California.

17. Gentiana oregana Engelm.; A. Gray, Syn. Fl. **2**^{1}: 122. 1878.
Meadows of the artemisia, pinyon, yellow pine, and aspen belts; Idaho. British Columbia to Idaho and California.

3. FRASERA Walt.

Leaves with distinct white margin.
Sepals broadly ovate, acute; corolla yellowish green, with purple spots; basal leaves lanceolate; stem 1 to 2 meters high ---- **3. F. utahensis.**
Sepals lanceolate, acuminate; corolla greenish yellow, without purple spots; basal leaves linear-oblanceolate; stems 0.3 to 1 meter high.
Plant glabrous ---- **1. F. albomarginata.**
Plant glandular-puberulent ---- **2. F. induta.**
Leaves without a distinct white margin. Plants 0.3 to 1.5 meters high; basal leaves oblanceolate, 10 to 30 cm. long; inflorescence a thyrse; corolla greenish white, dark-spotted.
Plant glabrous or puberulent ---- **4. F. speciosa.**
Plant scabro-puberulent ---- **5. F. scabra.**

1. Frasera albomarginata S. Wats. in King, Geol. Expl. 40th Par. **5**: 280. 1871.
Mesas and pine forests. Southern Utah, Nevada, and Arizona.

2. Frasera induta Tidestrom, Proc. Biol. Soc. Washington **36**: 183. 1923.
Rocky places of the pinyon belt; Charleston Mountains, Nevada.

3. Frasera utahensis Jones, Zoe **2**: 13. 1891.
Mesas and dry hillsides. Southern Utah and Arizona.

4. Frasera speciosa Dougl.; Hook. Fl. Bor. Amer. **2**: 66. *pl. 153.* 1838.
Aspen and spruce belts. South Dakota to Oregon, southward to New Mexico and California.

5. Frasera scabra (Jones) Rydb. Bull. Torrey Club **33**: 149. 1906.
Frasera speciosa scabra Jones, Zoe **4**: 277. 1893.
Aspen and spruce belts. Colorado, Utah, New Mexico, and Arizona.

4. SWERTIA L.

Inflorescence congested; corolla dark bluish purple, the lobes oval, obtuse or emarginate, 8 to 10 mm. long; basal leaves elliptic to oblanceolate. **1. S. congesta.**
Inflorescence elongate; corolla greenish white to dark bluish purple, the lobes oblong to lanceolate, 10 mm. long; basal leaves elliptic to oblanceolate, long or short-petioled ---- **2. S. scopulina.**

1. **Swertia congesta** A. Nels. Bull. Torrey Club **28**: 228. 1901.
Spruce and alpine belts. Montana, Idaho, Wyoming, and Utah (?)

2. **Swertia scopulina** Greene, Pittonia **4**: 184. 1900.
Swertia palustris A. Nels. Bull. Torrey Club **28**: 227. 1901.
Swertia fritillaria Rydb. Bull. Torrey Club **40**: 465. 1913.
Spruce and alpine belts. Montana to New Mexico, Utah, and Idaho.

103. MENYANTHACEAE. Bogbean Family

Perennial aquatic or marsh herbs with creeping rootstocks; leaves alternate, long-petioled, 3-foliolate, the leaflets oblong or obovate; flowers racemose or paniculate, on scapelike peduncles, 5-merous; calyx deeply 5-parted; corolla funnelform, 5-lobed, the lobes bearded within; stamens 5, inserted on the corolla tube, alternating with the lobes; style 1; ovary 1-celled, with 2 parietal placentae; fruit a septicidal capsule; seeds numerous.

1. MENYANTHES L. Bogbean

1. **Menyanthes trifoliata** L. Sp. Pl. 145. 1753.
Swamps and wet meadows; Ruby Valley, Nevada. Greenland to Alaska, southward to Pennsylvania, Nebraska, and California; also in Europe and Asia.

104. APOCYNACEAE. Dogbane Family

Perennial herbs (our species) with milky acrid juice; leaves estipulate; flowers 5-merous; calyx inferior, gamosepalous; corolla gamopetalous; stamens 5, inserted on the corolla tube and alternating with the lobes; style 1 or wanting; ovaries 2, distinct; placentae parietal; fruit of 2 slender terete follicles; seeds numerous.

Leaves alternate, entire; flowers in terminal corymbiform cymes; corolla salverform, the tube cylindric; style present; seeds not appendaged. **1. AMSONIA.**

Leaves opposite, entire; flowers urceolate or campanulate; style wanting; seeds appendaged **2. APOCYNUM.**

1. AMSONIA Walt. Amsonia

Plants densely villous or tomentose, 20 to 40 cm. high. Leaves ovate-lanceolate to linear-lanceolate, nearly sessile; corolla about 15 mm. long, the lobes oblong; follicles about 8 cm. long **1. A. tomentosa.**

Plants green, glabrous or nearly so, 30 to 50 cm. high.

Corolla lobes oblong, about 8 mm. long; follicles linear, not torulose, 6 cm. long. Leaves ovate, acuminate, crowded, 2 to 5 cm. long; flowers lead-purple **2. A. latifolia.**

Corolla lobes ovate, 4 to 6 mm. long; follicles 4 to 8 cm. long, torulose.

Corolla tube about 10 mm. long; leaves ovate, the upper lanceolate. **3. A. brevifolia.**

Corolla tube about 15 mm. long; leaves narrowly lanceolate to lineur above **4. A. eastwoodiana.**

1. **Amsonia tomentosa** Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 316. 1845.
Valleys, canyons, and hillsides of the Covillea and artemisia belts. Northern Arizona, Nevada, and southern California.

2. Amsonia latifolia Jones, Contr. West. Bot. **12**: 50. 1908.

Plains and hillsides of the Covillea and artemisia belts. Western Colorado to southern Nevada and Arizona.

3. Amsonia brevifolia A. Gray, Proc. Amer. Acad. **12**: 64. 1876.

Plains and hillsides of the Covillea and artemisia belts. New Mexico and southern Utah, westward to southern California.

4. Amsonia eastwoodiana Rydb. Bull. Torrey Club **40**: 465. 1913.

Plains and foothills of the Covillea and artemisia belts. Central Utah and Arizona.

2. APOCYNUM L. Dogbane

Corolla 4 mm. long or less, the lobes commonly erect. Calyx about 2 mm. long; plants 30 to 150 cm. high.

Leaves commonly rounded or cordate at base, sessile or nearly so, clasping, elliptic-ovate to oblong-lanceolate_____1. **A. hypericifolium.**

Leaves commonly petioled, with acute base, ovate to oblong-lanceolate. **2. A. cannabinum.**

Corolla 5 mm. long or more, the lobes revolute or spreading. Calyx less than half as long as the corolla.

Leaves more or less pubescent beneath.

Stem and leaves puberulent. Leaves truncate to subcordate, 2 to 6 cm. long, acute; calyx lobes lanceolate, 2 to 3 mm. long. **7. A. tomentellum.**

Stems glabrous or nearly so.

Leaves elliptic-lanceolate to ovate-oblong, 6 to 13 cm. long, pale green above, glaucous beneath; calyx lobes 2 mm. long or more; plant 1 meter high or more_____3. **A. lividum.**

Leaves ovate, rounded or truncate, 3 to 6 cm. long, dark green above, pale beneath; calyx lobes 1 mm. long; plant 20 to 60 cm. high. **6. A. androsaemifolium.**

Leaves glabrous or nearly so.

Plants 10 to 15 cm. high, the herbage leaden gray. Leaves orbicular to ovate, 1 to 3 cm. long; flowers red-purple_____8. **A. plumbeum.**

Plants 20 cm. high or more. Corolla flesh-colored.

Leaves orbicular to ovate, rounded or cordate at base, 3 to 5 cm. long, obtuse or acute_____4. **A. ambigens.**

Leaves oval to round-ovate, 3 to 5 cm. long, commonly retuse, mucronate_____5. **A. calophyllum.**

1. Apocynum hypericifolium Ait. Hort. Kew. **1**: 304. 1789.

Apocynum nevadense Goodding, Bot. Gaz. **37**: 57. 1904.

Plains and hillsides of the artemisia and pinyon belts. Ontario to Ohio, westward to British Columbia and California.

2. Apocynum cannabinum L. Sp. Pl. 213. 1753.

Apocynum oliganthum Greene, Leaflets **1**: 58. 1904.

Plains and hillsides of the Covillea and artemisia belts. Anticosti to Florida, westward to British Columbia and California.

3. Apocynum lividum Greene, Pl. Baker. **3**: 17. 1901.

Canyons of the pinyon, yellow pine, and aspen belts. Colorado, New Mexico, and Utah.

4. Apocynum ambigens Greene, Pl. Baker. **3**: 17. 1901.

Pinyon, yellow pine, aspen, and spruce belts. Montana to New Mexico, westward to Washington and California.

5. Apocynum calophyllum Greene, Leaflets 1: 57. 1904.

Sandy places in valleys, upward to the yellow pine belt. Nevada and California. Perhaps only a form of the preceding species.

6. Apocynum androsaemifolium L. Sp. Pl. 213. 1753.

Mountain sides and canyons, upward to the aspen belt. Nova Scotia to Alaska, southward to New Mexico and Utah.

7. Apocynum tomentellum Greene, Leaflets 1: 58. 1904.

Canyons and slopes, upward to the yellow pine belt. Nevada and California.

8. Apocynum plumbeum Greene, Leaflets 2: 185. 1912.

In valleys. Nevada.

105. ASCLEPIADACEAE. Milkweed Family

Erect or twining, perennial herbs, mostly with milky juice; leaves opposite, verticillate, or alternate; flowers regular or irregular, umbellate, 5-merous; calyx hypogynous, with a short tube, or sepals nearly free; corolla rotate, urceolate, campanulate, or funnelform; corona 5-lobed (wanting in *Astephanus*), borne between the corolla and the stamens, the latter monadelphous or free; anther sacs with or without a scarious membrane at the top; ovary of 2 carpels, developing into 2 many-seeded follicles; seeds comose.

Plants twining.

Leaves filiform, nearly glabrous; flowers small, yellow, short-pedunculate; follicles 4 cm. long, acuminate ..... **1. ASTEPHANUS.**

Leaves not filiform; flowers white or purplish, about 8 mm. in diameter. **2. FUNASTRUM.**

Plants not twining.

Corolla-lobes spreading in anthesis, greenish; hoods purple, crested. Stems several from a stout root; leaves lanceolate to linear-lanceolate, 10 cm. long or more; umbels long-pedunculate; follicles lanceolate. **6. ASCLEPIADORA.**

Corolla-lobes reflexed in anthesis.

Hoods crested within; follicles smooth ..... **5. ASCLEPIAS.**

Hoods not crested within.

Leaves mostly scattered, linear, 10 cm. long or more; flowers small, greenish or purplish, in axillary umbels; follicles lanceolate, acuminate ..... **4. ACERATES.**

Leaves opposite, cordate-ovate, sessile, 7 cm. long or more; flowers dark-purple; follicles ovate-lanceolate, smooth and glabrous. **3. GOMPHOCARPUS.**

1. ASTEPHANUS R. Br.

1. Astephanus utahensis Engelm. Amer. Nat. 9: 349. 1875.

Dry sandhills of the Covillea belt. Southern Utah and Arizona to Nevada and California.

2. FUNASTRUM Fourn.

Leaves cordate-ovate to subsagittate, 4 cm. long or less, the lobes large; flowers white, numerous; follicles about 10 cm. long ..... **1. F. cynanchoides.**

Leaves linear, with a truncate or sagittate base, 4 cm. long or less; flowers purplish, few; follicles 10 to 12 cm. long, acuminate ..... **2. F. heterophyllum.**

1. Funastrum cynanchoides (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 284. 1914.

Sarcostemma cynanchoides Decaisne in DC. Prodr. 8: 540. 1844.

Philibertella cynanchoides Vail, Bull. Torrey Club **24**: 307. 1897.

Plains and low hills of the Covillea belt. Texas to southern Utah (?), Arizona, and Mexico.

2. Funastrum heterophyllum (Engelm.) Standl. Contr. U. S. Nat. Herb. **23**: 1170. 1924.

Sarcostemma heterophyllum Engelm. in Torr. U. S. Rep. Expl. Miss. Pacif. **5**: 362. 1856.

Philibertella heterophylla Cockerell, Bot. Gaz. **26**: 279. 1898.

Mesas and low hills of the Covillea belt. Southern California to Utah, Texas, and Mexico.

3. GOMPHOCARPUS R. Br.

1. Gomphocarpus cordifolius Benth.; A. Gray in Brewer & Wats. Bot. Calif. **1**: 477. 1876.

Acerates cordifolia Benth. Pl. Hartw. 323. 1849.

Valleys and foothills of the artemisia, pinyon, and yellow pine belts. Nevada and California.

4. ACERATES Ell.

1. Acerates auriculata Engelm. in Torr. U. S. & Mex. Bound. Bot. 160. 1859.

Mesas and dry canyons of the artemisia belt. Nebraska to Texas, westward to eastern Utah and Arizona.

5. ASCLEPIAS L. Milkweed

Leaves linear to linear-oblong, 1 to 10 mm. wide.

Leaves 1 to 2 mm. broad, verticillate; flowers small, greenish-white. **11. A. galioides.**

Leaves 4 to 10 mm. broad.

Plant glabrous or nearly so; leaves verticillate, 6 to 15 cm. long; flowers small, greenish-white tinged with purple----**10. A. mexicana.**

Plant hirsute; leaves about 1 cm. broad, sessile, alternate or opposite; flowers orange----**1. A. tuberosa.**

Leaves lanceolate or broader.

Plants glabrous or nearly so. Flowers large, greenish yellow or white; follicles ovate or ovate-oblong.

Leaves broadly ovate, abruptly pointed, 5 to 8 cm. long, short-petioled or nearly sessile----**4. A. cryptoceras.**

Leaves lanceolate to linear-lanceolate, 7 to 12 cm. long, nearly sessile. **9. A. labriformis.**

Plants decidedly hairy, pubescent, or tomentose.

Leaves 2 to 5 cm. long, ovate to lanceolate, short-petioled, sparingly cinereous-puberulent. Umbels sessile; flowers greenish white, tinged with purple----**7. A. involucrata.**

Leaves 6 to 20 cm. long.

Leaves oblong-lanceolate, the petioles 5 to 10 mm. long, the blades 7 to 10 cm. long. Flowers from deep rose-purple to flesh-colored. **2. A. incarnata.**

Leaves ovate-lanceolate to broadly elliptic.

Leaves sessile or nearly so, ovate-lanceolate, the margins erose or denticulate. Flowers greenish-white----**6. A. erosa.**

Leaves more or less petiolate.

Petioles about 2 mm. long; leaf blades broadly ovate, rounded or emarginate, mucronate, 5 to 14 cm. long, puberulent (nearly glabrous in age); flowers greenish----**5. A. latifolia.**

Petioles 3 to 15 mm. long; leaf blades ovate-lanceolate to oval.
Flowers purplish, large; corolla lobes 8 to 10 mm. long, the hoods a little longer; leaves subcordate, oval to oblong, canescent-tomentose; pods echinate ..... 3. **A. speciosa.**
Flowers greenish white or purplish; corolla lobes and hoods about 6 mm. long; leaves ovate-lanceolate; pods tomentulose or glabrate ..... 8. **A. hallii.**

1. Asclepias tuberosa L. Sp. Pl. 217. 1753. PLEURISY-ROOT.

Artemisia, pinyon, and yellow pine belts. Ontario to Florida, westward to Utah and Arizona.

2. Asclepias incarnata L. Sp. Pl. 215. 1753.

Aspen belt. New Brunswick to Florida, westward to Manitoba, Utah, and Mexico.

3. Asclepias speciosa Torr. Ann. Lyc. N. Y. **2**: 218. 1828.

Plains and valleys of the artemisia, pinyon, yellow pine, and aspen belts. Saskatchewan to Kansas, westward to British Columbia and California.

4. Asclepias cryptoceras S. Wats. in King, Geol. Expl. 40th Par. **5**: 283. *pl. 28, f. 1–4*. 1871.

Plains and canyons of the artemisia and pinyon belts. Utah and Idaho to Oregon and California.

5. Asclepias latifolia (Torr.) Raf. Atl. Journ. 146. 1832–33.

Asclepias obtusifolia latifolia Torr. Ann. Lyc. N. Y. **2**: 217. 1828.

Dry plains; Moab, Utah. South Dakota to Texas, westward to Utah and Arizona.

6. Asclepias erosa Torr. U. S. & Mex. Bound. Bot. 162. 1859.

Plains and canyons of the Covillea and lower artemisia belts. Southern Utah to Arizona, westward to California.

7. Asclepias involucrata Engelm. in Torr. U. S. & Mex. Bound. Bot. 163. 1859.

Plains and canyons upward to 1,800 meters. Southern Utah to New Mexico and Arizona.

8. Asclepias hallii A. Gray, Proc. Amer. Acad. **12**: 69. 1876.

Canyons and mountain sides of the pinyon, yellow pine, and aspen belts. Colorado to Nevada.

9. Asclepias labriformis Jones, Proc. Calif. Acad. II. **5**: 708. 1895.

Canyons and dry hillsides of the artemisia and pinyon belts. Southern Utah.

10. Asclepias mexicana Cav. Icon. Pl. **1**: 42. *pl. 58*. 1791.

Valleys and canyons of the Covillea and artemisia belts. Washington to California, Utah, and Mexico.

11. Asclepias galioides H. B. K. Nov. Gen. & Sp. **3**: 188. 1818.

Plains, dry hillsides, and canyons of the Covillea belt and upward to the yellow pine belt. Kansas to Utah and Mexico.

6. ASCLEPIODORA A. Gray

1. Asclepiodora decumbens (Nutt.) A. Gray, Proc. Amer. Acad. **12**: 66. 1876.

Anantherix decumbens Nutt. Trans. Amer. Phil. Soc. n. ser. **5**: 201. 1837.

Plains, desert areas, and mountain sides of the Covillea and artemisia belts, upward to 2,400 meters. Kansas to Texas, westward to Nevada and Mexico.

106. CUSCUTACEAE. Dodder Family

Annual parasitic twining herbs with filiform, white or yellow stems; leaves reduced to minute alternate scales; flowers small, cymosely clustered, 5 (rarely 4)-merous; calyx gamosepalous or of 5 distinct sepals; corolla campanulate, ovoid, or globose, 5-cleft; stamens appendaged at base, inserted in the throat of the corolla and alternating with the lobes; ovary superior, 2-celled; ovules 2 in each cell; styles 2, distinct or connate; fruit a 4-seeded capsule.

1. CUSCUTA L. Dodder

Stigmas filiform; styles distinct, equal. Flowers in dense globular clusters; capsule circumscissile ..... 1. C. planiflora.
Stigmas capitate or peltate; styles equal or unequal.
  Flowers in umbellate clusters, usually shorter than the slender pedicels; calyx and corolla lobes acuminate; capsule circumscissile. ..... 2. C. umbellata.
  Flowers in dense globular clusters or small cymes; capsules indehiscent or bursting irregularly.
    Lobes of the calyx and corolla obtuse.
      Ovary and capsule depressed-globose. Corolla lobes shorter than the tube, the scales fringed ..... 3. C. cephalanthi.
      Ovary and capsule pointed.
        Calyx lobes and scales denticulate ..... 6. C. denticulata.
        Calyx lobes entire, the scales 2-fid or truncate ..... 7. C. curta.
    Lobes of the corolla acute or acuminate.
      Calyx lobes obtuse; corolla persistent, the lobes reflexed. ..... 4. C. arvensis.
      Calyx lobes acute; corolla at length deciduous.
        Corolla lobes lance-subulate, entire ..... 5. C. californica.
        Corolla lobes ovate-lanceolate, crenulate.
          Calyx lobes brown-striped; flowers in cymose-paniculate clusters; tips of the corolla lobes incurved ..... 8. C. indecora.
          Calyx lobes not brown-striped; flowers in small clusters; tips of the corolla lobes not incurved ..... 9. C. salina.

1. Cuscuta planiflora Ten. Fl. Napol. 3: 250. 1824–29.

On species of *Medicago, Eriogonum, Chrysothamnus*, and other herbs and shrubs. Throughout the Great Basin; introduced from Europe.

2. Cuscuta umbellata H. B. K. Nov. Gen. & Sp. 3: 121. 1818.

On cultivated beets and other herbs. Colorado and Texas to Utah (?), Arizona, and Mexico.

3. Cuscuta cephalanthi Engelm. Amer. Journ. Sci. 43: 336. *pl. 6, f. 1–6.* 1842.

On herbs and shrubs, Pennsylvania to Saskatchewan, southward to Texas and Arizona.

4. Cuscuta arvensis Beyr.; Hook. Fl. Bor. Amer. 2: 77. 1838.

On sugar-beets and other herbs. Massachusetts to Florida, westward to British Columbia and California.

5. Cuscuta californica Choisy, Mém. Soc. Phys. Hist. Nat. Genève 9: 279. 1841.

On herbs and shrubs of arid regions. Washington to California.

6. Cuscuta denticulata Engelm.; Parry, Amer. Nat. 9: 348. 1875.

On herbs and shrubs of the arid regions. Southern Utah, Nevada, and southern California.

7. **Cuscuta curta** Engelm.; Rydb. Colo. Agr. Exp. Sta. Bull. 100: 273. 1906.
On coarse herbs of the artemisia and pinyon belts. Colorado to New Mexico, westward to Nevada.

8. **Cucusta indecora** Choisy, Mém. Soc. Phys. Hist. Nat. Genève 9: 278. 1841.
On alfalfa and other herbs and shrubs of the plains. Illinois to California, southward to Florida and South America.

9. **Cuscuta salina** Engelm. in Brewer & Wats. Bot. Calif. 1: 536. 1876.
On *Salicornia* and other plants of the saline areas. Utah to Arizona and California.

107. CONVOLVULACEAE. Morning-glory Family

Herbs (our species), erect, trailing, or twining, with alternate estipulate leaves; flowers axillary, solitary or cymose, 5-merous; calyx with distinct sepals or 5-parted, the segments imbricate; corolla gamopetalous, funnelform to tubular or subrotate; stamens inserted on the corolla tube; ovary sessile, superior, 2(rarely 3)-celled with 2 ovules in each cell; styles 1 or 2; fruit a globular, 2 to 6-seeded capsule.

Leaves small, 1 cm. long or less, elliptic to oblong or oval, mostly acute, sessile, silvery-canescent; flowers small, the corolla funnelform; styles 2; ovary and capsule pubescent. Perennials 10 to 30 cm. high. **1. CRESSA.**

Leaves ample, entire or lobed, linear-hastate to reniform-hastate, petioled, acute or obtuse; flowers large; style 1. Stigmas 2, linear. **2. CONVOLVULUS.**

1. CRESSA L.

Corolla lobes broadly ovate, obtuse; stamens not exserted; plant prostrate or creeping, silvery-canescent ---------- **1. C. minima.**

Corolla lobes oblong or elliptic, acutish; stamens more or less exserted; plant with ascending or decumbent stems, grayish-sericeous. **2. C. truxillensis.**

1. **Cressa minima** Heller, Muhlenbergia 8: 140. *f. 28.* 1913.
Saline meadows of the artemisia belt; Washoe County, Nevada.

2. **Cressa truxillensis** H. B. K. Nov. Gen. & Sp. 3: 119. 1818.
Cressa depressa Goodding, Bot. Gaz. 37: 58. 1904.
Cressa erecta Rydb. Bull. Torrey Club 40: 466. 1913.
Saline meadows and desert areas of the Covillea and artemisia belts. Utah to California, southward to Texas, Mexico, and South America.

2. CONVOLVULUS L. Bindweed

Leaves velvety-tomentose, reniform-hastate to sagittate. Bracts ovate, at the base of and equaling the calyx; corolla cream-colored, 2 to 3 cm. long, campanulate-funnelform; stems depressed, scarcely twining. **1. C. malacophyllus.**

Leaves glabrous or pubescent, not velvety-tomentose.

Leaves mostly linear-hastate, entire, cuspidate. Sepals ovate, obtuse, mucronate; corolla white or cream-colored, broadly funnelform; stems scarcely twining ---------- **4. C. longipes.**

Leaves with ample blades; corolla funnelform, white or rose-tinged; twining perennials.

Bracts cordate-ovate, enclosing the calyx; corolla 5 cm. long; leaves deltoid-hastate to triangular-sagittate, the basal lobes entire or angulately 2 or 3-lobed ..... 2. C. sepium.

Bracts small, remote from the calyx; corolla 1.5 to 2 cm. long; leaves oblong-sagittate or hastate. the basal lobes acute ..... 3. C. arvensis.

1. Convolvulus malacophyllus Greene, Pittonia **3**: 326. 1898.

Convolvulus villosus A. Gray, Proc. Amer. Acad. **11**: 90. 1876. Not *C. villosus* Pers. 1805.

Meadows and open copses of the yellow pine belt; near Lake Tahoe. California and western Nevada (?).

2. Convolvulus sepium L. Sp. Pl. 153. 1753.

Fields and waste places. Nova Scotia to British Columbia, southward to North Carolina, New Mexico, and Nevada; also in Europe and Asia.

3. Convolvulus arvensis L. Sp. Pl. 153. 1753.

Convolvulus ambigens House, Bull. Torrey Club **32**: 139. 1905.

Fields and waste places. Nova Scotia to British Columbia, southward to New Jersey, New Mexico, and California; also in Europe.

4. Convolvulus longipes S. Wats. Amer. Nat. **7**: 302. 1873.

Valleys and hillsides of the Covillea belt. Southern Nevada and southeastern California.

108. POLEMONIACEAE. Phlox Family

Annual or perennial herbs or undershrubs; leaves alternate or opposite, entire to dissected, estipulate; flowers regular or irregular, 5-merous; calyx gamosepalous; corolla gamopetalous; stamens inserted on the tube or throat of the corolla and alternate with the lobes; style 1; stigmas 3; ovary 3-celled, with 2 or more ovules in each cell; placentae central; fruit a 3-valved loculicidal capsule.

Leaves represented by the cotyledons and the floral bracts. Diminutive annuals, 2 to 6 cm. high; flowers subumbellate, the subtending bracts lanceolate to oblong ..... 9. GYMNOSTERIS.

Leaves (proper) present.

Leaves prevailingly opposite.

Stamens equally inserted on the corolla tube. Corolla campanulate to salverform; leaves simple or palmately parted, the segments filiform. 10. LINANTHUS.

Stamens unequally inserted on the corolla tube.

Flowers conspicuous, solitary or cymose; corolla salverform, with a narrow throat; annuals or perennials ..... 1. PHLOX.

Flowers small, solitary, axillary; corolla salverform; small branched annuals ..... 3. MICROSTERIS.

Leaves prevailingly alternate (opposite in species of *Leptodactylon*).

Anthers sagittate. Flowers in dense heads; corolla salverform, with open throat; leaves simple or pinnatifid, the segments linear or filiform. 4. WELWITSCHIA.

Anthers not sagittate.

Stamens unequally inserted on the tube of the corolla. Calyx accrescent in fruit; corolla funnelform or salverform; annuals with entire or pinnatifid leaves ..... 2. COLLOMIA.

Stamens equally inserted on the tube or on the throat of the corolla.
Plants perennial.
Leaves palmately parted, spinulose. Corolla funnelform; undershrubs or perennials with a woody base.
6. LEPTODACTYLON.
Leaves simple, pinnatifid, or pinnate.
Calyx green; flowers solitary or clustered; corolla campanulate to rotate-funnelform, blue or white; leaves pinnately parted (at least below)----------**11. POLEMONIUM.**
Calyx more or less scarious in the sinuses; flowers mostly cymose; corolla salverform or trumpet-shaped, with an open throat.
8. GILIA.
Plants annual.
Calyx teeth unequal or spinulose-laciniate. Leaves pinnatifid; corolla salverform, the throat funnelform.
5. NAVARRETIA.
Calyx lobes equal, never spinulose-laciniate.
Calyx lobes long-setose; leaves pinnatifid, the lower segments modified into bristles----------**7. LANGLOISIA.**
Calyx lobes not long-setose; leaves entire or pinnatifid, not modified into bristles----------**8. GILIA.**

1. PHLOX L. PHLOX

Plants loosely tufted; flowers in cymes, white, pink, or rose-colored; leaves 1.5 to 6 cm. long, linear or linear-lanceolate.
Plants glabrous or pubescent, scarcely glandular. Leaves linear, 3 to 6 cm. long; calyx 10 mm. long or more; corolla white, the tube exceeding the calyx----------**1. P. longifolia.**
Plants (at least the inflorescence) more or less glandular or viscid. Leaves linear to linear-lanceolate, 3 cm. long or less (rarely longer).
Calyx 7 mm. long; corolla tube about 10 mm. long; plant 15 cm. high or less----------**2. P. gooddingii.**
Calyx 10 to 14 mm. long; corolla tube 15 to 25 mm. long; plant 30 cm. high or less, glandular or pubescent throughout--**3. P. stansburyi.**
Plants more or less cespitose; flowers solitary; leaves linear to linear-lanceolate.
Leaves flat or nearly so (often revolute in no. 10), 1 to 2 mm. broad or more, sharp-pointed. Calyx teeth equaling the tube.
Leaves glabrous, 1 to 2 cm. long; corolla light blue or white, nearly 2 cm. long, the lobes obovate, equaling the tube--**4. P. multiflora.**
Leaves more or less glandular, 1 to 3 cm. long; corolla twice longer than the calyx, the lobes obovate, 5 to 8 mm. long.
Corolla tube pilose outside----------**5. P. gladiformis.**
Corolla tube glabrous outside.
Leaves 6 to 8 mm. long, hispid-ciliate----------**7. P. caespitosa.**
Leaves 3 to 5 mm. long----------**10. P. covillei.**
Leaves more or less revolute, 1 mm. broad or less.
Leaves beset with woolly hairs; corolla tube twice longer than the calyx. Plants densely cespitose, 5 cm. high or less.
Leaves imbricate, at length spreading, 5 to 10 mm. long.
11. P. canescens.
Leaves densely imbricate, appressed, 3 mm. long or less.
12. P. bryoides.

Leaves ciliate, glandular or pubescent, not woolly; corolla tube exceeding the calyx.
Plants 3 cm. high or less, densely matted; leaves densely imbricate, 4 to 6 mm. long. Corolla tube 12 mm. long, twice longer than the calyx.
Leaves with a tapering spinulose tip----------8. P. rigida.
Leaves abruptly pointed----------9. P. dejecta.
Plants 4 to 15 cm. high; leaves 4 to 20 mm. long, more or less spreading.
Calyx glandular----------8. P. rigida.
Calyx not glandular, more or less pubescent.
Intercostal portion of calyx replicate----------6. P. austromontana.
Intercostal portion of calyx plane----------13. P. douglasii.

1. Phlox longifolia Nutt. Journ. Acad. Phila. 7: 41. 1834.

Pinyon, yellow pine, and aspen belts. Montana to Colorado, westward to Washington.

2. Phlox gooddingii Nels. & Kennedy, Muhlenbergia 3: 141. 1908.

Mountain sides of the Covillea belt. Southern Nevada.

3. Phlox stansburyi (Torr.) Heller, Bull. Torrey Club 24: 478. 1897.

Phlox speciosa stansburyi Torr. U. S. & Mex. Bound. Bot. 145. 1859.

Foothills and canyons of the artemisia belt, upward to the spruce belt. Colorado to New Mexico, westward to California.

4. Phlox multiflora A. Nels. Bull. Torrey Club 25: 278. 1898.

Rocky ridges and slopes of the aspen and spruce belts. Montana to Colorado and northern Utah.

5. Phlox gladiformis (Jones) E. Nels. Rev. Phlox 21. 1899.

Phlox longifolia gladiformis Jones, Proc. Calif. Acad. Sci. II. 5: 711. 1895.

Pinyon belt. Central and southern Utah.

6. Phlox austromontana Coville, Contr. U. S. Nat. Herb. 4: 151. 1893.

Phlox austromontana prostrata E. Nels. Rev. Phlox 19. 1899.

Phlox densa Brand in Engl. Pflanzenreich IV. 250: 83. 1907.

Pinyon, yellow pine, and aspen belts. Central Utah and Arizona, westward to California.

7. Phlox caespitosa Nutt. Journ. Acad. Phila. 7: 41. 1834.

Spruce and alpine belts. Montana to northern New Mexico, westward to Oregon and Washington.

8. Phlox rigida Benth. in DC. Prodr. 9: 306. 1845.

Spruce and alpine belts. Idaho to Washington, Nevada, and Utah.

9. Phlox dejecta Nels. & Kennedy, Proc. Biol. Soc. Washington 19: 37. 1906.

Spruce and subalpine belts; Mount Rose, Nevada.

10. Phlox covillei E. Nels. Rev. Phlox 15. 1899.

Canyons and rocky slopes, upward to 2,700 meters. Eastern California and adjacent Nevada.

11. Phlox canescens Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. 2[2]: 122. *pl. 6.* 1855.

Valleys and canyons, upward to the aspen belt. Colorado to California, northward to Washington.

12. Phlox bryoides Nutt. Journ. Acad. Phila. II. 1: 153. 1848.

Plains and dry hillsides of the artemisia and pinyon belts. Wyoming and Colorado to Utah.

13. Phlox douglasii Hook. Fl. Bor. Amer. **2:** 73. 1838.

Foothills and canyons of the artemisia, pinyon, yellow pine, and aspen belts. Idaho to Washington, Nevada, and California.

2. COLLOMIA Nutt.

Leaves oblong to broadly ovate, entire or 3-lobed, tapering into a petiole.
Flowers axillary and terminal; corolla funnelform, violet or purplish, 15 mm. long; perennial, 10 cm. high or less ..... **5. C. debilis.**
Leaves lanceolate or linear, entire.
Flowers in clusters terminating the branches, leafy-bracted.
Corolla 2 to 3 cm. long, tubular-funnelform, salmon-colored; plant 30 to 70 cm. high, glabrous below, pubescent above ..... **1. C. grandiflora.**
Corolla 1 cm. long, funnelform, lilac-purple; plant 30 cm. high or less, puberulent, viscid above ..... **2. C. linearis.**
Flowers axillary, solitary, Corolla salverform, purple; plants viscid-pubescent, diffusely branching from near the base, 5 to 15 cm. high; leaves linear-lanceolate, 1.5 to 4.5 cm. long.
Calyx about 4 mm. long, the tube twice longer than the triangular teeth. **3. C. tenella.**
Calyx about 7 mm. long, the tube equaling the triangular-aristate teeth. **4. C. tinctoria.**

1. Collomia grandiflora Dougl.; Lindl. Bot. Reg. **14:** *pl. 1174.* 1828.

Plains, canyons, and on mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Montana to Utah, westward to British Columbia and California.

2. Collomia linearis Nutt. Gen. Pl. **1:** 126. 1818.

Collomia lanceolata Greene; Brand in Engl. Pflanzenreich IV. **250:** 49. 1907.

Moist places in the pinyon, yellow pine, aspen, and spruce belts. Minnesota to Nebraska, westward to British Columbia and California.

3. Collomia tenella A. Gray, Proc. Amer. Acad. **8:** 259. 1870.

Gilia leptotes A. Gray, Proc. Amer. Acad. **17:** 223. 1882.

Dry hillsides and canyons of the artemisia and pinyon belts. Utah to Nevada, Idaho, and Washington.

4. Collomia tinctoria Kellogg, Proc. Calif. Acad. **3:** 17. *f. 2.* 1863.

Dry foothills and canyons, upward to 2,100 meters. Washington to California and Nevada.

5. Collomia debilis (S. Wats.) Greene, Pittonia **1:** 127. 1887.

Gilia debilis S. Wats. Amer. Nat. **7:** 302. 1873.

Spruce and subalpine belts. Montana to Utah, westward to Washington and California.

3. MICROSTERIS Greene

Calyx 4 to 5 mm. long, puberulent, the lobes not longer than the tube. Corolla 5 to 7 mm. long, the tube white, the limb rose-colored; plant 10 cm. high or less; leaves oblong to linear ..... **1. M. micrantha.**
Calyx 7 to 10 mm. long, glandular-pubescent.
Calyx lobes not longer than the tube; corolla 8 to 10 mm. long, the tube white, the limb purplish; plant diffuse, 15 to 20 cm. high; leaves oblanceolate to spatulate ..... **2. M. humilis.**
Calyx lobes much longer than the tube; corolla 10 to 14 mm. long, the tube yellowish, the limb purplish; plant slender, 10 to 40 cm. high; leaves spatulate to linear ..... **3. M. gracilis.**

1. Microsteris micrantha (Kellogg) Greene, Pittonia **3:** 303. 1898.
Collomia micrantha Kellogg, Proc. Calif. Acad. **3:** 18. *f. 3.* 1863.
Meadows, canyons, and mountain sides of the artemisia belt, upward to the spruce belt. Nebraska to New Mexico, Arizona, and California.

2. Microsteris humilis Greene, Pittonia **3:** 301. 1898.
Meadows, canyons, and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Montana to Colorado, westward to British Columbia and California.

3. Microsteris gracilis (Dougl.) Greene, Pittonia **3:** 300. 1898.
Collomia gracilis Dougl. in Curtis's Bot. Mag. **56:** *pl. 2924.* 1829, as synonym.
Meadows and moist canyons of the artemisia, pinyon, yellow pine, and aspen belts. Montana to Utah, westward to California and British Columbia.

4. WELWITSCHIA Reichenb.

Plants perennial, 15 to 30 cm. high, canescent-lanate when young, glabrate in age. Leaves rigid, spinulose-pinnatifid; corolla violet-blue, the tube 12 mm. long----------**1. W. densifolia.**
Plants annual; leaves floccose, entire or 3-parted.
Corolla lobes nearly equaling the tube, 7 mm. long, violet-blue to white. Stems much branched, 10 to 20 cm. high----------**2. W. floccosa.**
Corolla lobes much shorter than the tube; corolla blue.
Heads of flowers with an acute base; bracts ascending; stems 10 to 20 cm. high, more or less erect----------**3. W. filifolia.**
Heads of flowers broad, with a rounded base; bracts spreading; stems low, diffuse, 1 to 10 cm. high----------**4. W. diffusa.**

1. Welwitschia densifolia (Benth.) Tidestrom.
Hugelia densifolia Benth. in Lindl. Bot. Reg. **19:** sub *pl. 1622.* 1833.
Plains and hillsides of the Covillea and artemisia belts. Central California to southern Nevada, Arizona, and Mexico.

2. Welwitschia floccosa (A. Gray) Rydb. Fl. Rocky Mount. 688, 1065. 1917.
Gilia floccosa A. Gray, Proc. Amer. Acad. **8:** 272. 1870.
Valleys, desert areas, and hillsides of the Covillea, artemisia, and pinyon belts. Oregon to California, eastward to Utah and Arizona.

3. Welwitschia filifolia (Nutt.) Rydb. Fl. Rocky Mount. 688, 1065. 1917.
Gilia filifolia Nutt. Journ. Acad. Phila. II. **1:** 156. 1848.
Gilia wilcoxii A. Nels. Bot. Gaz. **34:** 27. 1902.
Plains and mountain sides of the artemisia and pinyon belts. Washington to California, eastward to Utah, Arizona, and New Mexico.

4. Welwitschia diffusa (A. Gray) Rydb. Fl. Rocky Mount. 688, 1065. 1917.
Gilia filifolia diffusa A. Gray, Proc. Amer. Acad. **8:** 272. 1870.
Plains and dry hillsides of the Covillea belt. Texas to southern Utah and California.

5. NAVARRETIA Ruiz & Pav.

Plants minutely glandular-puberulent, 5 to 20 cm. high; corolla yellow. Plant diffusely branched; leaves mostly with simple acicular segments. **1. N. breweri.**
Plants glabrate or pubescent, not at all glandular; corolla white or purplish.
Leaves once or twice pinnatifid, the segments acicular.
Plant depressed, tufted, 5 cm. high or less, the stems glabrate; calyx tube hairy in the sinuses; corolla 2 mm. long----------**2. N. minima.**

Plant erect, simple or branched, 3 to 12 cm. high, the stems retrorsely pubescent; calyx tube villous; corolla 5 mm. long_____3. **N. intertexta.**

1. **Navarretia breweri** (A. Gray) Greene, Pittonia 1: 137. 1887.
Gilia breweri A. Gray, Proc. Amer. Acad. 8: 269. 1870.
Foothills and canyons of the artemisia, pinyon, yellow pine, and aspen belts. Wyoming to Utah, westward to California.

2. **Navarretia minima** Nutt. Journ. Acad. Phila. II. 1: 160. 1848.
Foothills and canyons of the artemisia and pinyon belts. Saskatchewan to Nebraska, westward to Washington and California.

3. **Navarretia intertexta** (Benth.) Hook. Fl. Bor. Amer. 2: 75. 1838.
Aegochloa intertexta Benth. in Lindl. Bot. Reg. 19: sub *pl. 1622*. 1833.
Foothills, canyons, and meadows of the artemisia and pinyon belts. Montana to Washington, southward to California.

6. LEPTODACTYLON Nutt.

Leaves opposite.
Leaves glabrous to hispidulous, the segments linear, 10 to 18 mm. long; corolla white, with yellow throat; plants 10 to 30 cm. high, with numerous whitish stems_____1. **L. nuttallii.**
Leaves glandular, the segments awl-shaped, acerose, 10 to 16 mm. long; corolla whitish, with purple throat; plants 10 to 20 cm. high.
2. L. watsoni.
Leaves alternate. Corolla trumpet-shaped, rose, white, or yellowish, 12 to 20 mm. long.
Plants low, densely cespitose, the stems short, densely clothed with persistent crowded leaves; corolla about 12 mm. long, 4-merous.
3. L. caespitosum.
Plants 10 to 60 cm. high, suffrutescent or shrubby, the branches elongate, not densely beset with leaves; corolla 15 to 20 mm. long, 5-merous.
Leaves 2 to 10 mm. long, mostly erect_____4. **L. pungens.**
Leaves (at least some of them) stout, pungent, squarrose__5. **L. patens.**

1. **Leptodactylon nuttallii** (A. Gray) Rydb. Colo. Agr. Exp. Sta. Bull. 100: 279. 1906.
Gilia nuttallii A. Gray, Proc. Amer. Acad. 8: 267. 1870.
Canyons, rocky slopes, and ridges of the artemisia belt and upward to the spruce belt. Wyoming to New Mexico, westward to Washington and California.

2. **Leptodactylon watsoni** (A. Gray) Rydb. Colo. Agr. Exp. Sta. Bull. 100: 279. 1906.
Gilia watsoni A. Gray, Proc. Amer. Acad. 8: 267. 1870.
Rocky hillsides and dry canyons of the artemisia and pinyon belts. Colorado and Utah.

3. **Leptodactylon caespitosum** Nutt. Journ. Acad. Phila. II. 1: 157. 1848.
Dry canyons of the artemisia and pinyon belts. Wyoming and Utah.

4. **Leptodactylon pungens** (Torr.) Nutt. Journ. Acad. Phila. II. 1: 157. 1848.
Cantua pungens Torr. Ann. Lyc. N. Y. 2: 220. 1828.
Leptodactylon brevifolium Rydb. Bull. Torrey Club 40: 474. 1913.
Canyons and dry rocky mountain sides of the artemisia belt, upward to the spruce belt. Montana to Colorado, westward to Washington and California.

5. Leptodactylon patens Heller, Muhlenbergia **1**: 146. 1906.
Gilia pungens squarrosa A. Gray, Proc. Amer. Acad. **8**: 268. 1870.
Canyons and dry rocky mountain sides of the artemisia belt, upward to the spruce belt. Utah to California.

7. LANGLOISIA Greene

Corolla bilabiate, white to pink or purplish; ascending or procumbent annuals with linear-oblong setose-pinnatifid leaves.
Corolla 10 mm. long, the lobes oblong, acute, 4 mm. long or less, slightly exceeding the calyx ..... 1. L. schottii.
Corolla 12 to 16 mm. long, the lobes spatulate or cuneate, obtuse, retuse or tridentate, 6 to 8 mm. long, twice longer than the calyx. 2. L. matthewsii.
Corolla regular, white; low branching annuals with linear or spatulate leaves.
Corolla tube 10 mm. long, the oval lobes 3 to 5 mm. long .. 3. L. setosissima.
Corolla tube 10 mm. long, the lobes nearly equaling the tube.
Flowers distinctly pediceled; plant lanate ..... 4. L. lanata.
Flowers subsessile; plant glabrate. Corolla purple-dotted. 5. L. punctata.

1. Langloisia schottii (Torr.) Greene, Pittonia **3**: 30. 1896.
Navarretia schottii Torr. U. S. & Mex. Bound. Bot. 145. 1859.
Desert areas of the Covillea belt. Southern Utah to southern California and Mexico.

2. Langloisia matthewsii (A. Gray) Greene, Pittonia **3**: 30. 1896.
Loeselia matthewsii A. Gray, Bot. Calif. **2**: 466. 1880.
Desert areas of the Covillea belt. Southern Nevada to Arizona, southern California, and Mexico.

3. Langloisia setosissima (Torr. & Gray) Greene, Pittonia **3**: 30. 1896.
Navarretia setosissima Torr. & Gray, in Ives, Rep. Colo. Riv. 22. 1860.
Desert areas and dry hillsides of the Covillea belt. Southern Nevada to Arizona and southern California.

4. Langloisia lanata Brand in Engl. Pflanzenreich IV. **250**: 169. 1907.
Desert areas and dry hilsides of the artemisia belt; Candelaria, Nevada.

5. Langloisia punctata (Coville) Goodding, Bot. Gaz. **37**: 58. 1904.
Gilia setosissima punctata Coville, Proc. Biol. Soc. Washington **7**: 72. 1892.
Desert areas and mountain sides of the Covillea belt. Southern Nevada to Arizona and California.

8. GILIA Ruiz & Pav. GILIA

Inflorescence capitate or spicate-glomerate.
Leaves entire or toothed.
Plant 30 to 50 cm. high, suffrutescent. Leaves linear; calyx hairy, the teeth lanceolate; corolla white, 5 to 6 mm. long, the lobes oval, acute. 1. G. frutescens.
Plants 5 to 25 cm. high, annual or perennial.
Plant perennial, more or less villous; corolla white, 4 to 5 mm. long.
Leaves linear-filiform (rarely lobed); calyx villous, the teeth short. 2. G. spergulifolia.

Plant annual; corolla white, 5 to 6 mm. long.
Leaves linear-filiform; flowers in small terminal heads; calyx crisp-hairy, glandular, the teeth lanceolate_____10. G. gunnisonii.
Leaves oblanceolate, entire or few-toothed; calyx hairy, the teeth subulate_____11. G. depressa.
Leaves (at least some of them) pinnatifid or 3-cleft.
Plants annual, 5 to 20 cm. high, mostly branching from the base, crisp-hairy.
Leaves with linear lobes; calyx 5 mm. long, the teeth short, subulate; corolla 9 to 10 mm. long, white, the lobes oval_____12. G. pumila.
Leaves with short oblong lobes; calyx 4 to 5 mm. long, the teeth lanceolate; corolla 4 to 5 mm. long, white, the lobes minute.
13. G. polycladon.
Plants perennial.
Heads of flowers in a more or less dense spikelike inflorescence. Corolla greenish white, about 1 cm. long, the lobes oval, 3 to 4 mm. long; leaves with few lobes or entire; plant 10 to 30 cm. high.
3. G. spicata.
Heads of flowers single or in corymbs.
Leaves apparently palmatilobed, with 3 or more short, elliptic or oblong, acute segments.
Plant 10 cm. high or less, white-tomentose; leaves 5 to 7 mm. long, the lobes small; calyx 4 mm. long; corolla blue or white, the tube barely exserted_____8. G. nevadensis.
Plant 10 to 20 cm. high, villous with crisped hairs; leaves 1 to 2 cm. long; calyx 3 to 5 mm. long; corolla white, the tube barely exserted_____9. G. montana.
Leaves 3-cleft at the apex or pinnatifid.
Leaves 3-cleft above, 1 to 2 cm. long, the lobes oblong. Corolla white, 1 cm. long, the tube exserted_____5. G. tridactyla.
Leaves pinnatifid, 3-lobed, or palmately divided, the lobes long-linear.
Leaves palmately or pinnately 3-lobed; corolla white, 1 cm. long, the tube barely exserted_____6. G. nuda.
Leaves pinnatifid (at least some of them); corolla white, 7 to 8 mm. long.
Leaf segments mucronate: stems mostly simple.
4. G. congesta.
Leaf segments aristate; stems branched above.
7. G. iberidifolia.
Inflorescence openly paniculate or thyrsiform-paniculate, with evident pedicels (glomerate-thyrsiform in No. 19).
Leaves entire, rarely few-toothed, the basal sometimes pinnatifid.
Corolla companulate or rotate, the tube short. Pedicels slender or filiform.
Calyx glabrous. Corolla white or yellowish, 4 to 5 mm. long; glabrous annual, 8 to 25 cm. high; branches and leaves filiform.
39. G. filiformis.
Calyx, pedicels, and branches more or less glandular.
Corolla white, 6 to 8 mm. long, twice longer than the calyx; puberulent annual, 4 to 6 cm. high_____40. G. campanulata.
Corolla white or bluish, 3 mm. long; glandular-puberulent annual, 5 to 15 cm. high, with linear leaves_____36. G. tenerrima.

Corolla funnelform.
Pedicels very short; corolla 8 to 10 mm. long, twice longer than the calyx; glandular-puberulent annual, 4 to 12 cm. high, with linear to linear-lanceolate leaves----------34. G. subalpina.
Pedicels as long as the calyx or longer, filiform; glabrous or glandular annuals, 10 to 35 cm. high; leaves linear. Corolla 8 mm. long.
Corolla dark purple----------32. G. leptalea.
Corolla white----------33. G. capillaris.
Leaves (at least some of them) distinctly toothed or pinnatifid.
Corolla 20 to 40 mm. long, pink, scarlet, or white. Biennials, 20 to 50 cm. high; leaves pinnately parted into narrow segments.
Inflorescence more or less flat-topped.
Corolla 30 to 40 mm. long, white, the lobes round-ovate, obtuse, 10 mm. long----------17. G. longiflora.
Corolla 20 to 30 mm. long, white tinged with blue, the lobes ovate, acute, 4 to 5 mm. long----------18. G. laxiflora.
Inflorescence thyrsoid, narrow.
Corolla scarlet, the tube about 20 mm. long, the lobes ovate, acute; stems more or less crisp-hairy or glandular----------14. G. arizonica.
Corolla 30 mm. long or more, crimson to white; stems 30 to 60 cm. high.
Calyx glandular-pubescent----------15. G. aggregata.
Calyx, and commonly the inflorescence, with long white hairs as well as glandular pubescence----------16. G. pulchella.
Corolla 2 to 18 mm. long.
Stamens exserted.
Inflorescence narrow.
Stems simple, virgate, 30 cm. high or less, glandular-puberulent; leaf segments small, oblong, numerous; corolla white, 12 mm. long----------29. G. stenothyrsa.
Stems numerous, virgate, 30 to 60 cm. high, cinereous-puberulent; leaf segments linear; corolla purplish, salverform, 12 mm. long. 19. G. multiflora.
Inflorescence broad, the branches numerous, spreading. Plants 5 to 15 cm. high, branching from the base or nearly so.
Corolla tube 4 to 6 mm. long, yellowish, the limb violet; plant more or less glandular or glabrate; leaf segments linear. 20. G. calcarea.
Corolla tube 7 to 10 mm. long, sky-blue (as well as the oval lobes); plant glabrous, at least below; leaf segments oblong or obovate. 21. G. mcvickerae.
Stamens included.
Leaves orbicular to oblong or obovate, 4 to 8 cm. long, pinnatifid or dentate, the teeth triangular-spinulose. Corolla 6 to 8 mm. long, rose-colored; plant 10 to 25 cm. high, villous and glandular. 35. G. latifolia.
Leaves narrower.
Corolla 2 to 6 mm. long.
Corolla 2 mm. long, white, exceeding the calyx. Nearly glabrous, diffusely branched annual, 10 cm. high or less; leaf segments small, mucronate----------41. G. micromeria.

Corolla 4 to 6 mm. long. Leaf segments oblong to linear-oblong.
Plant with basal leaves only, bracted above, 10 to 20 cm. high, glandular-pubescent; calyx small, the teeth triangular, acute----------31. G. leptomeria.
Plants 10 to 40 cm. high; leaves scattered.
Plant glandular-puberulent; corolla 4 mm. long, bluish. 28. G. tweedyi.
Plant pubescent with white hairs; corolla about 6 mm. long, white or purplish----------38. G. gilioides.
Corolla 6 to 18 mm. long.
Limb of corolla 8 to 12 mm. broad.
Plant 10 to 30 cm. high, glandular-puberulent, mostly branching above. Leaves spatulate or oblanceolate, 1 to 4 cm. long, coarsely dentate; corolla 12 to 15 cm. long, the lobes ovate, acute----------30. G. subnuda.
Plants 10 to 30 cm. high, branching from the base. Corolla more or less campanulate.
Corolla 12 mm. long, lilac, with 5 dark spots at the throat; leaf segments triangular-oblong, spinulose. 23. G. ophthalmoides.
Corolla 14 to 18 mm. long, rose-colored, with violet throat; leaf segments oblong, mucronate----37. G. tenuiflora.
Limb of corolla 8 mm. broad or less.
Corolla tube scarcely exserted. Plant 20 to 40 cm. high, glandular-puberulent; leaf segments oblong, mucronate; calyx teeth subulate; corolla purplish------26. G. inconspicua.
Corolla tube exserted.
Calyx one-fourth as long as the corolla tube; corolla purple, with yellow throat. Stems glandular-pubescent, 10 to 20 cm. high; leaf segments short and broad, spinulose. 22. G. scopulorum.
Calyx one-half to two-thirds as long as the corolla tube.
Corolla 10 mm. long, ochroleucous; stems 10 to 20 cm. high, glabrous or sparingly glandular; leaves mostly basal, the pinnae obtuish----------27. G. ochroleuca.
Corolla 8 to 10 mm. long; stems 10 to 30 cm. high, glandular-pubescent.
Corolla lobes obtuse, purple; leaf segments oblong, mostly entire----------24. G. sinuata.
Corolla lobes acute; leaf segments oblong, mostly spinulose-toothed----------25. G. hutchinsifolia.

1. Gilia frutescens Rydb. Bull. Torrey Club **40**: 471. 1913.

Rocky hillsides and canyons of the Covillea and artemisia belts. Southern Utah.

2. Gilia spergulifolia Rydb. Bull. Torrey Club **31**: 633. 1904.

Pinyon belt. Montana to Colorado and Utah.

3. Gilia spicata Nutt. Journ. Acad. Phila. II. **1**: 156. 1848.

Plains and dry hillsides of the artemisia belt. Nebraska to Wyoming and eastern Utah (?).

4. Gilia congesta Hook. Fl. Bor. Amer. **2**: 75. 1838.

Plains and dry hillsides of the artemisia belt. Washington to Wyoming, northern Nevada, and California.

5. Gilia tridactyla Rydb. Fl. Rocky Mount. 693, 1065. 1917.
Spruce belt. Utah.

6. Gilia nuda (Eastw.) Rydb. Bull. Torrey Club **40:** 470. 1913.
Gilia congesta nuda Eastw. Proc. Calif. Acad. II. **6:** 308. 1896.
Rocky canyons of the artemisia belt. Southeastern Utah.

7. Gilia iberidifolia Benth. Journ. Bot. Kew Misc. **3:** 290. 1851.
Plains and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. South Dakota to Nebraska, westward to Utah.

8. Gilia nevadensis Tidestrom Proc. Biol. Soc. Washington **38:** 15. 1925.
Mountain sides of the aspen belt; Toiyabe Range, Nevada.

9. Gilia montana Nels. & Kennedy, Proc. Biol. Soc. Washington **19:** 37. 1906.
Spruce and subalpine belts. Idaho and Utah, westward to Oregon and California.

10. Gilia gunnisonii Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **2:** 128. *pl. 9.* 1855.
Sandy plains and canyons of the artemisia and pinyon belts. Colorado and eastern Utah to Arizona.

11. Gilia depressa Jones; A. Gray, Proc. Amer. Acad. **16:** 106. 1880.
Desert areas and hillsides of the Covillea and artemisia belts. Southern Utah and Arizona to California.

12. Gilia pumila Nutt. Journ. Acad. Phila. II. **1:** 156. 1848.
Plains and hillsides of the artemisia belt. Wyoming to western Texas, Utah, and Arizona.

13. Gilia polycladon Torr. U. S. & Mex. Bound. Bot. 146. 1859.
Desert areas and dry hillsides of the Covillea, artemisia, and pinyon belts. Western Texas to Utah, Arizona, and Nevada.

14. Gilia arizonica (Greene) Rydb. Bull. Torrey Club **40:** 472. 1913.
Callisteris arizonicus Greene, Leaflets **1:** 160. 1905.
Ridges and canyons of the aspen and spruce belts. Southern Utah and Arizona to southern Nevada.

15. Gilia aggregata (Pursh) Spreng. Syst. Veg. **1:** 626. 1825.
Cantua aggregata Pursh, Fl. Amer. Sept. 147. 1814.
Gilia scariosa Rydb. Bull. Torrey Club **31:** 632. 1904.
Gilia tenuituba Rydb. Bull. Torrey Club **40:** 472. 1913.
Aspen and spruce belts. Montana to New Mexico, westward to British Columbia and California.

16. Gilia pulchella Dougl.; Hook. Fl. Bor. Amer. **2:** 74. 1838.
Aspen and spruce belts. Montana to Colorado, westward to Washington and Nevada.

17. Gilia longiflora (Torr.) Don, Hist. Dichl. Pl. **4:** 245. 1838.
Cantua longiflora Torr. Ann. Lyc. N. Y. **2:** 221. 1828.
Plains and dry hillsides of the artemisia, pinyon, and yellow pine belts. Nebraska to Texas, westward to Utah and Arizona.

18. Gilia laxiflora (Coulter) Osterhout, Bull. Torrey Club **24:** 51. 1897.
Gilia macombii laxiflora Coulter, Contr. U. S. Nat. Herb. **1:** 44. 1889.
Plains and sandhills. Western Texas to Colorado and southeastern Utah.

19. Gilia multiflora Nutt. Journ. Acad. Phila. II. **1:** 154. 1848.
Plains and dry hillsides of the Covillea belt. New Mexico to southern Nevada.

20. Gilia calcarea Jones, Contr. West. Bot. **8**: 36. 1898.

Plains and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts; Green River, Wyoming. Nebraska to New Mexico and Wyoming.

21. Gilia mcvickerae Jones, Proc. Calif. Acad. II. **5**: 712. 1895.

Dry gravelly slopes of the artemisia and pinyon belts. Utah.

22. Gilia scopulorum Jones, Bull. Torrey Club **8**: 70. 1881.

Rocky places of the Covillea belt. Southern Utah and Nevada.

23. Gilia ophthalmoides Brand in Engl. Pflanzenreich IV. **250**: 108. 1907.

Plains, washes, and mountain sides of the Covillea, artemisia, and pinyon belts. Nevada.

24. Gilia sinuata Dougl.; Benth. in DC. Prodr. **9**: 313. 1845.

Plains and mountain sides of the artemisia and pinyon belts. Oregon to California, eastward to Colorado and Arizona.

25. Gilia hutchinsifolia Rydb. Bull. Torrey Club **40**: 472. 1913.

Plains and hillsides of the Covillea belt. Southern Utah to Arizona and Nevada.

26. Gilia inconspicua (J. E. Smith) Dougl. in Curtis's Bot. Mag. **56**: *pl. 2883*. 1829.

Ipomopsis inconspicua J. E. Smith, Exot. Bot. **1**: 25. *pl. 14*. 1804.

Plains and foothills of the artemisia and pinyon belts. Wyoming to New Mexico, westward to Washington and California.

27. Gilia ochroleuca Jones, Contr. West. Bot. **8**: 35. 1898.

Plains and hillsides of the Covillea belt. Southeastern California and southern Nevada.

28. Gilia tweedyi Rydb. Bull. Torrey Club **31**: 634. 1904.

Plains and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Wyoming and Idaho to Colorado and Utah.

29. Gilia stenothyrsa A. Gray, Proc. Amer. Acad. **8**: 276. 1870.

Pinyon belt. Utah.

30. Gilia subnuda Torr.; A. Gray, Proc. Amer. Acad. **8**: 276. 1870.

Gilia superba Eastw. Zoe **4**: 122, 296. *pl. 27*. 1893.

Plains, canyons, and mountain sides of the artemisia and pinyon belts. Southern Utah to New Mexico, Arizona, and Nevada.

31. Gilia leptomeria A. Gray, Proc. Amer. Acad. **8**: 278. 1870.

Gilia subacaulis Rydb. Bull. Torrey Club **30**: 261. 1903.

Valleys, plains, and mountain sides of the Covillea, artemisia, and pinyon belts. Colorado and New Mexico, westward to Oregon and California.

32. Gilia leptalea (A. Gray) Greene, Erythea **4**: 58. 1896.

Collomia leptalea A. Gray, Proc. Amer. Acad. **8**: 261. 1870.

Valleys and slopes of the Sierra Nevada. Oregon to California and western Nevada.

33. Gilia capillaris Kellogg, Proc. Calif. Acad. **5**: 46. 1873.

Valleys and mountain sides of the artemisia and yellow pine belts. Oregon and California to western Nevada.

34. Gilia subalpina Greene; Brand in Engl. Pflanzenreich IV. **250**: 98. 1907.

Valleys and canyons of the artemisia and yellow pine belts. California and western Nevada.

35. Gilia latifolia S. Wats. in Parry, Amer. Nat. **9**: 347. 1875.

Desert areas and low washes of the Covillea belt. Southwestern Utah and Arizona to southern California.

36. Gilia tenerrima A. Gray, Proc. Amer. Acad. **8**: 277. 1870.

Valleys and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Montana to Wyoming, Utah, and Oregon.

37. Gilia tenuiflora Benth. in Lindl. Bot. Reg. **19**: sub *pl. 1622*. 1833.

Foothills of the Sierra Nevada. California and western Nevada.

38. Gilia gilioides (Benth.) Greene, Erythea **1**: 93. 1893.

Collomia gilioides Benth. in Lindl. Bot. Reg. **19**: sub *pl. 1622*. 1833.

Yellow pine and aspen belts; Sierra Nevada. Southern Oregon and California to western Nevada.

39. Gilia filiformis Parry; A. Gray, Proc. Amer. Acad. **10**: 75. 1874.

Desert areas and dry hillsides of the Covillea and artemisia belts. Southwestern Utah and Arizona to southern California.

40. Gilia campanulata A. Gray, Proc. Amer. Acad. **8**: 279. 1870.

Plains and dry hillsides of the artemisia belt. Nevada and California.

41. Gilia micromeria A. Gray, Proc. Amer. Acad. **8**: 279. 1870.

Valleys and mountain sides of the artemisia and yellow pine belts. Oregon to Nevada and California.

9. GYMNOSTERIS Greene

Corolla 10 to 15 mm. long, white or yellowish, the lobes 3 to 4 mm. long, obovate; glabrous annual, 5 to 10 cm. high; bracts subtending the flowers lanceolate ..... **1. G. nudicaulis.**

Corolla 6 to 8 mm. long, white or pinkish, the lobes 1 to 1.5 mm. long, acutish; glabrous annual, 2 to 3 cm. high; bracts ovate-lanceolate. **2. G. rydbergii.**

1. Gymnosteris nudicaulis (Hook. & Arn.) Greene, Pittonia **3**: 304. 1898.

Collomia nudicaulis Hook. & Arn. Bot. Beechey Voy. 368. 1840.

Gymnosteris pulchella Greene, Pittonia **3**: 304. 1898.

Artemisia plains. Oregon and Idaho to Nevada.

2. Gymnosteris rydbergii Tidestrom.

Gilia parvula Rydb. Mem. N. Y. Bot. Gard. **1**: 320. 1900. Not *G. parvula* Greene, 1887.

Aspen and spruce belts. Wyoming and Colorado to Utah and Idaho.

10. LINANTHUS Benth.

Flowers on long filiform pedicels; calyx 2 to 4 mm. long. Corolla campanulate, the tube short.

Corolla 10 mm. long or more, yellow; plant diffusely branched, 10 to 20 cm. high, hirsutulous. Leaf segments 5 mm. long or less ..... **1. L. aureus.**

Corolla 7 mm. long or less, white or rose-colored; annuals 5 to 45 cm. high.

Calyx hirsutulous or strigose; corolla 7 to 8 mm. long; plant more or less hirsutulous ..... **2. L. pharnecioides.**

Calyx glabrous; corolla 3 to 4 mm. long; plant glabrous. **3. L. harknessii.**

Flowers subsessile or short-pediceled; calyx 4 mm. long or more.

Corolla salverform, 2 cm. long or less, the tube filiform; plant 4 to 15 cm. high, pubescent. Leaves ciliate ..... **9. L. neglectus.**

Corolla campanulate or salverform, the tube short; plants small.
Corolla 10 mm. long or more, showy.
Calyx 5 mm. long; corolla white or purplish; plant pubescent, branched from the base----------4. L. parryae.
Calyx 10 mm. long or more; corolla white; plant erect, glabrous, simple-stemmed or branching----------6. L. dichotomus.
Corolla 8 mm. long or less, white.
Calyx glandular, 6 mm. long. Plant small----------7. L. jonesii.
Calyx not glandular.
Calyx about 4 mm. long; plant 2 to 5 cm. high--5. L. dactylophyllus.
Calyx about 8 mm. long; plant 10 to 30 cm. high----8. L. bigelovii.

1. Linanthus aureus (Nutt.) Greene, Pittonia **2**: 257. 1892.
Gilia aurea Nutt. Journ. Acad. Phila. II. **1**: 155. *pl. 22*. 1848.
Valleys, mesas, and sandhills of the Covillea and artemisia belts; southeastern California. Western Texas to southern California.

2. Linanthus pharnecioides (Benth.) Greene, Pittonia **2**: 254. 1892.
Gilia pharnecioides Benth. in Lindl. Bot. Reg. **19**: sub *pl. 1622*. 1833.
Plains, canyons, and on mountain sides of the artemisia and pinyon belts. Washington to California and Utah.

3. Linanthus harknessii (Curran) Greene, Pittonia **2**: 255. 1892.
Gilia harknessii Curran, Bull. Calif. Acad. **1**: 12. 1884.
Valleys, canyons, and mountain sides of the artemisia belt and upward to the spruce belt. Montana to Colorado, westward to British Columbia and California.

4. Linanthus parryae (A. Gray) Greene, Pittonia **2**: 256. 1892.
Gilia parryae A. Gray, Proc. Amer. Acad. **12**: 76. 1876.
Desert areas and hillsides of the Covillea belt; Mohave Desert, California. Perhaps beyond the limits of Nevada.

5. Linanthus dactylophyllus (Torr.) Rydb. Fl. Rocky Mount. 698, 1065. 1917.
Gilia dactylophyllum Torr. in Ives, Rep. Colo. Riv. 22. 1860.
Plains and hillsides of the Covillea belt. Southern Utah to Arizona and California.

6. Linanthus dichotomus Benth. in Lindl. Bot. Reg. **19**: *pl. 1622*. 1833.
Plains and hillsides of the Covillea and artemisia belts. Southern Utah and Nevada to Arizona and California.

7. Linanthus jonesii (A. Gray) Greene, Pittonia **2**: 254. 1892.
Gilia jonesii A. Gray, Syn. Fl. ed. 2. **2**^{1}: 407. 1886.
Plains, hillsides, and washes of the Covillea belt. Southeastern California to southern Nevada and Arizona.

8. Linanthus bigelovii (A. Gray) Greene, Pittonia **2**: 253. 1892.
Gilia bigelovii A. Gray, Proc. Amer. Acad. **8**: 265. 1870.
Desert areas and dry hillsides of the Covillea belt. Texas to southern Utah and southern California.

9. Linanthus neglectus Greene, Erythea **3**: 24. 1895.
Plains, canyons, and mountain sides of the artemisia, pinyon, and yellow pine belts. Nevada and California to Oregon.

11. POLEMONIUM L. POLEMONIUM

Leaflets simple or divided; inflorescence dense; corolla funnelform. Plants 5 to 30 cm. high.

Corolla ochroleucous, bluish, or greenish, 20 mm. long or more. Leaflets or segments oval to broadly linear, in pairs or in verticils of 3 or 4.
8. P. brandegei.

Corolla purple.
Corolla 20 to 30 mm. long; leaflets 2 to 8 mm. long, the segments round-oval; plant glandular-viscid; flowers densely capitate.
9. P. confertum.

Corolla 15 to 18 mm. long, the lobes rounded, shorter than the tube; leaflets 4 mm. long or less, the segments orbicular; plant more or less viscid; flowers spicate----------**10. P. viscosum.**

Leaflets simple; inflorescence open; corolla campanulate.
Corolla white, equaling or shorter than the calyx. Leaflets 5 or more pairs, obovate or oblanceolate, 10 mm. long or less; annual, branching from the base, 10 to 20 cm. high, viscid-pubescent----------**1. P. micranthum.**
Corolla blue, purple, or white, much exceeding the calyx.
Stems commonly numerous, 10 to 30 cm. high. Leaflets 12 or fewer pairs; plants puberulent or viscid-glandular.
Leaflets orbicular to broadly ovate or obovate, commonly 5 mm. long or less; calyx lobes blunt; corolla pale blue, the tube scarcely exceeding the calyx----------**3. P. montrosense.**
Leaflets oval to lanceolate, 5 to 15 mm. long; calyx lobes lanceolate; corolla blue, 10 mm. long, the tube white----------**2. P. pulcherrimum.**
Stems mostly solitary, leafy, 40 to 100 cm. high.
Flowers white or cream-colored, corymbose-cymose. Leaflets lanceolate or oblong-lanceolate, 1 to 3 cm. long; plant more or less glandular.
5. P. albiflorum.
Flowers blue or purple, 1 to 2 cm. long.
Rootstock creeping. Flowers in a narrow thyrse; leaflets linear to oblong-lanceolate, the upper often decurrent; plant viscid-pubescent----------**4. P. occidentale.**
Rootstock not creeping. Plants glandular above; leaflets lanceolate.
Corolla 20 mm. long or nearly so; stem glabrous below; inflorescence cymose-corymbose----------**6. P. archibaldae.**
Corolla 12 mm. long or less; stem pilose below; inflorescence flat-topped----------**7. P. foliosissimum.**

1. Polemonium micranthum Benth. in DC. Prodr **9**: 318. 1845.
Damp places on plains, waste places, and foothills of the artemisia and pinyon belts. Montana to British Columbia, southward to Utah and California.

2. Polemonium pulcherrimum Hook. in Curtis's Bot. Mag. **57**: *pl. 2979*. 1830.
Polemonium scopulinum Greene; Rydb. Colo. Agr. Exp. Sta. Bull. **100**: 280. 1906.
Polemonium delicatum Rydb. Bull. Torrey Club **28**: 29. 1901.
Aspen, spruce, and alpine belts. Alberta to British Columbia, southward to New Mexico.

3. Polemonium montrosense A. Nels. Proc. Biol. Soc. Washington **18**: 174. 1905.
Spruce and subalpine belts; Mount Rose, Nevada.

4. Polemonium occidentale Greene, Pittonia **2**: 75. 1890.
Open woods of the pinyon, yellow pine, aspen, and spruce belts. Saskatchewan to Alaska, southward to Colorado, California, and Arizona.

5. Polemonium albiflorum Eastw. Bot. Gaz. **37**: 437. 1904.
Aspen and spruce belts. Utah, Nevada, and Idaho.

6. **Polemonium archibaldae** A. Nels. Bot. Gaz. **31**: 397. 1901.
Polemonium grande Greene, Leaflets **1**: 153. 1905.
Spruce belt. Colorado and Utah.

7. **Polemonium foliosissimum** A. Gray, Syn. Fl. **2**[1]: 151. 1878.
Canyons and grassy slopes of the aspen, spruce, and alpine belts. Colorado to Nevada.

8. **Polemonium brandegei** (A. Gray) Greene, Pittonia **1**: 126. 1887.
Gilia brandegei A. Gray, Proc. Amer. Acad. **11**: 73. 1876.
Spruce and alpine belts. Colorado and Utah.

9. **Polemonium confertum** A. Gray, Proc. Acad. Phila. **1863**: 73. 1864.
Rocky places of the spruce and alpine belts. Wyoming to Utah and northern New Mexico.

10. **Polemonium viscosum** Nutt. Journ. Acad. Phila. II. **1**: 154. 1848.
Spruce and alpine belts. Alberta to Idaho, Wyoming, and Nevada.

109. HYDROPHYLLACEAE. Waterleaf Family

Annual or perennial herbs; leaves estipulate, mostly alternate, simple or compound; flowers regular, 5-merous, solitary and axillary, in cymes or scorpioid racemes; style 2-cleft, or the styles 2; ovary 1-celled, with 2 parietal placentae, the ovules numerous; fruit a 1-celled many-ovuled capsule.

Plants acaulescent, dwarf. Leaves rosulate, petioled, entire, oblanceolate to elliptic; flowers axillary, white or purplish; stamens included; capsule ovoid ..... **8. CAPNOREA.**

Plants caulescent.

Plants shrubs or undershrubs, more or less glutinous. Leaves coriaceous, reticulate beneath; flowers paniculate, white or purple; styles 2; capsule globose, crustaceous ..... **9. ERIODICTYON.**

Plants annuals, perennials, or undershrubs, if shrubs not glutinous.

Leaves mostly entire, sometimes few-toothed or pinnatifid.

Sepals unequal, the 3 outer cordate to orbicular, the inner spatulate.

Corolla purplish, campanulate; plants 20 cm. high or less; leaves spatulate or oblanceolate; flowers racemose ..... **7. TRICARDIA.**

Sepals equal or nearly so.

Flowers axillary, solitary or few; stamens unequally inserted. Corolla funnelform; small, dichotomously branched annuals. **6. CONANTHUS.**

Flowers racemose; stamens equally inserted.

Corolla purple, blue, or white, deciduous ..... **4. PHACELIA.**

Corolla yellow or whitish, persistent ..... **5. EMMENANTHE.**

Leaves once or twice pinnatifid.

Calyx with appendages in the sinuses. Flowers solitary, axillary or terminal; corolla appendaged within, campanulate to rotate; stamens included; diffuse annuals ..... **2. NEMOPHILA.**

Calyx without appendages.

Corolla yellow or whitish ..... **5. EMMENANTHE.**

Corolla blue, purple, or white, often with a yellow tube.

Flowers in capitate or headlike clusters (distinctly pediceled in No. 2). Stamens conspicuously exserted; leaves ample, lobed or pinnately divided; capsule 1 to 4-seeded. **1. HYDROPHYLLUM.**

Flowers in panicled or simple, more or less scorpioid racemes. Corolla purple, blue, or white.
Flowers in loose racemes; appendages of the corolla minute or plicate among the stamens; leaves opposite or alternate, pinnatifid; small annuals, more or less glandular-pubescent.
3. NYCTELEA.
Flowers in more or less scorpioid racemes; appendages of the corolla free or coalescent with filaments; leaves mostly alternate, entire to bipinnatifid; annuals, biennials, or perennials----------**4. PHACELIA.**

1. HYDROPHYLLUM L. WATERLEAF

Peduncles shorter than the petiole; leaf segments obovate, entire or cleft; plants 10 to 30 cm. high, more or less grayish-pubescent.
Flowers capitate-cymose; corolla 7 to 8 mm. long----------**1. H. capitatum.**
Flowers on slender pedicels; corolla 5 to 6 mm. long----------**2. H. alpestre.**
Peduncles exceeding the leaves; leaf segments 7 or more.
Leaf segments acuminate, ovate-lanceolate, serrate. Corolla 8 mm. long; plant 30 to 60 cm. high, sparingly hirsute----------**3. H. fendleri.**
Leaf segments acute, mucronate. Corolla 7 to 9 mm. long.
Leaves more or less densely canescent-pilose, the segments ovate to oblanceolate, more or less lobed; plant 10 to 30 cm. high----------**4. H. watsoni.**
Leaves hispid beneath, the segments ovate, more or less lobed; plant 20 to 60 cm. high----------**5. H. occidentale.**

1. Hydrophyllum capitatum Dougl.; Benth. Trans. Linn. Soc. Bot. **17**: 273. 1835.
Pinyon, yellow pine, aspen, and spruce belts. Montana to Colorado, westward to British Columbia and California.

2. Hydrophyllum alpestre Nels. & Kennedy, Muhlenbergia **3**: 142. 1908.
Yellow pine, aspen, and spruce belts. Nevada and California.

3. Hydrophyllum fendleri (A. Gray) Heller, Pl. World **1**: 23. 1897.
Hydrophyllum occidentale fendleri A. Gray, Proc. Amer. Acad. **10**: 314. 1875.
Aspen, spruce, and alpine belts. Wyoming to New Mexico and Utah.

4. Hydrophyllum watsoni (A. Gray) Rydb. Bull. Torrey Club **40**: 478. 1913.
Hydrophyllum occidentale watsoni A. Gray, Proc. Amer. Acad. **10**: 314. 1875.
Pinyon, yellow pine, and aspen belts. Utah to California.

5. Hydrophyllum occidentale A. Gray, Proc. Amer. Acad. **10**: 314. 1875.
Canyons and mountain sides of the yellow pine and aspen belts. Oregon and California to western Nevada.

2. NEMOPHILA Nutt. NEMOPHILA

Leaves enlarged and clasping at base, the lobes oblong, obtuse, the blade nearly as broad as long, cleft halfway to the midrib. Corolla equaling the calyx; prostrate plant with glabrous stems----------**1. N. arizonica.**
Leaves not enlarged at base nor clasping.
Leaves alternate, pinnately parted into 5 or 6 oblong lobes; flowers on slender peduncles, opposite the leaves. Calyx exceeding the whitish violet corolla; plant diffusely branched, sparingly pilose----------**3. N. breviflora.**

Leaves opposite (at least the lower); flowers pedunculate, axillary.
Leaves ovate with cuneate base, commonly lobed halfway to the midrib, the lobes broad, rounded, entire; corolla slightly exceeding the calyx; plant branching from the base, the stems with scattered deflexed bristles----------2. N. austinae.
Leaves oblong, deeply pinnatifid, the lobes entire or dentate; corolla 3 mm. long, shorter than the calyx; plant diffusely branched, pilose.
4. N. pedunculata.

1. **Nemophila arizonica** Jones, Contr. West. Bot. **12**: 50. 1908.
Desert areas of the Covillea belt; Mohave Desert. Arizona and southern California to southern Nevada (?).

2. **Nemophila austinae** Eastw. Bull. Torrey Club **28**: 143. *pl. 15, f. 4.* 1901.
Lava beds and canyons of the artemisia belt. Washington to California and Nevada.

3. **Nemophila breviflora** A. Gray, Proc. Amer. Acad. **10**: 315. 1875.
Pinyon, yellow pine, and aspen belts. Utah to Montana and Washington.

4. **Nemophila pedunculata** Dougl.; Benth. Trans. Linn. Soc. Bot. **17**: 275. 1835.
Canyons of the artemisia and yellow pine belts. Washington to Nevada and California.

3. NYCTELEA Scop.

Calyx lobes obovate or broadly spatulate; corolla bright blue, with yellow tube.
1. N. micrantha.
Calyx lobes ovate or lanceolate, exceeding the white or blue corolla.
2. N. pinetorum.

1. **Nyctelea micrantha** (Torr.) Woot. & Standl. Contr. U. S. Nat. Herb. **19**: 535. 1915.
Phacelia micrantha Torr. U. S. & Mex. Bound. Bot. 144. 1859.
Canyons and dry hillsides of the Covillea and artemisia belts. Western Texas to southern Utah and California.

2. **Nyctelea pinetorum** (Jones) Tidestrom.
Phacelia pinetorum Jones, Zoe **4**: 279. 1893.
Yellow pine areas. Utah.

4. PHACELIA Juss. PHACELIA

Leaves or leaflets nearly as broad as long.
Leaves pinnate or the uppermost simple. The leaflets suborbicular to ovate, crenate or lobed; corolla white, campanulate, 5 mm. long; plant glandular-pilose----------1. P. pedicellata.
Leaves simple, entire or toothed.
Leaves entire, orbicular to subreniform, 1 to 2 cm. broad. Flowers crowded; plants annual, 10 cm. high or less, glandular-puberulent.
Corolla 8 to 9 mm. long, purple----------21. P. pulchella.
Corolla 5 mm. long, violet----------23. P. demissa.
Leaves toothed.
Leaf blades 3 to 6 cm. long, cordate-ovate to subrotund, crenate, fleshy.
Corolla blue or purple.
Corolla 5 mm. long; plant branching from the base, 20 cm. high or less, glandular-viscid----------36. P. pachyphylla.
Corolla 10 to 15 mm. long; plant subsimple, 10 to 35 cm. high, glandular-viscid----------37. P. calthifolia.

Leaf blades 1 to 3 cm. long, thin.
Stamens exserted. Corolla 6 mm. long, purplish; leaf blades suborbicular, crenate; plant 10 to 20 cm. high, glandular-villous.
4. P. orbicularis.
Stamens included.
Lower pedicels much longer than the calyx. Leaves cordate-orbicular, deeply crenate; plants more or less glandular-hirsute.
Plant suffrutescent, with numerous slender stems (these tomentose below); corolla white, about 8 mm. long.
27. P. perityloides.
Plant annual or biennial, 30 cm. high or less; corolla lilac-purple, 10 mm. long or more_____**28. P. glechomaefolia.**
Lower pedicels equaling or shorter than the calyx.
Calyx 8 to 9 mm. long, purple. Leaves commonly entire, rarely toothed_____**21. P. pulchella.**
Corolla 4 to 5 mm. long, white or purple.
Leaves broadly obovate-cuneate to ovate, irregularly crenate; plant glandular-viscid, 10 to 25 cm. high__**24. P. lemmoni.**
Leaves round-cordate; plant simple or branching, 20 cm. high or less, glandular-hirsute_____**26. P. rotundifolia.**
Leaves oblong, elliptic, or linear, twice as long as broad or more.
Leaves prevailingly entire, or some of them pinnate or auricled with few entire leaflets or lobes.
Plants perennial, 10 to 60 cm. high. Stamens exserted; filaments bearded; corolla 5 to 6 mm. long.
Corolla lilac; plant 20 cm. high or less, hirsute and grayish-strigose or tomentulose; calyx hispid_____**13. P. alpina.**
Corolla usually white; plant hirsute and pubescent or tomentulose, 30 to 60 cm. high; calyx hirsute-ciliate_____**14. P. heterophylla.**
Plants annuals.
Stamens exserted.
Corolla 5 to 6 mm. long, blue or purple; leaves elliptic to oblanceolate; plant 10 to 20 cm. high, pilose or hirsute, diffusely branched.
15. P. humilis.
Corolla 8 to 10 mm. long, blue or white; leaves linear, simple or pinnatifid with linear lobes; plant 10 to 40 cm. high, grayish-puberulent_____**19. P. linearis.**
Stamens included. Plants 10 cm. high or less.
Flowers sessile in dense spikes or heads. Corolla 4 to 5 mm. long, white, with white, blue, or purple limb; plant divaricately branched; leaves spatulate, glandular-hirsute__**22. P. cephalotes.**
Flowers pediceled.
Corolla equaling or shorter than the calyx, blue. Calyx hispid-glandular, 3 mm. long; plant diffusely branched; leaves spatulate_____**25. P. saxicola.**
Corolla 5 to 8 mm. long, surpassing the calyx. Plants branching from the base.
Plant pubescent and hispid; leaves lanceolate or oblong, 1 to 4 cm. long. Corolla light blue or white_____**20. P. curvipes.**
Plants viscid-glandular; leaves oblong to obovate, the blades 1 cm. long or less.
Basal leaves entire; corolla white, 5 to 6 mm. long.
29. P. pusilla.
Basal leaves crenate-serrate; corolla yellowish, 6 to 8 mm. long, the limb purple_____**35. P. crassifolia.**

Leaves prevailingly deeply toothed, pinnatifid, or bipinnatifid.
Plants perennial, 20 cm. high or more.
Leaves simple, incisely few-toothed or cleft, the lobes broad, rounded, silky-pubescent on both sides. Plant 15 to 30 cm. high, hirsute and glandular; flowers white or violet-blue, in a dense inflorescence.
18. P. hydrophylloides.
Leaves once or twice pinnatifid, or cleft to the midrib or nearly so.
Leaves once or twice pinnatifid, the lobes ovate, crenate, 1 to 2 cm. long; corolla blue, 7 to 8 mm. long; stamens exserted. Plants 40 to 70 cm. high, puberulent to hirsute or glandular-pilose.
Sepals lanceolate, distant, more or less contracted at base.
11. P. ramosissima.
Sepals obovate, crowded, tapering to the base--**12. P. suffrutescens.**
Leaves pinnatifid or pinnate; corolla blue, 5 to 6 mm. long; stamens long-exserted.
Leaves sericeous, 3 to 10 cm. long, the entire or toothed lobes linear or linear-oblong; plant 10 to 30 cm. high, villous to strigose.
16. P. sericea.
Leaves green, sparingly pubescent or strigose, 3 to 15 cm. long, the lobes broad, oblong; plant 45 cm. high or less, villous-hirsute to strigose----------**17. P. idahoensis.**
Plants annual.
Stamens included.
Corolla equaling or shorter than the calyx, light blue or yellowish. Plant 10 to 20 cm. high, glandular-hispid, diffusely branching; leaves pinnatifid, the lobes oblong, entire or toothed.
31. P. affinis.
Corolla exceeding the calyx.
Leaves toothed or shallowly lobed, elliptic-oblong, long-petioled.
Corolla campanulate, 8 to 9 mm. long, violet or blue, with yellowish throat; plant low, diffusely branched, viscid-pubescent.
34. P. gymnoclada.
Leaves once or twice pinnatifid.
Leaves twice pinnatifid, the lobes small, nearly linear. Plant diffusely branched, puberulent; corolla 1 cm. long, funnelform.
32. P. bicolor.
Leaves pinnatifid to pinnate.
Corolla cylindric, 3 to 4 mm. long, white or pale purple. Plant hirsute, often glandular, branched, 5 to 30 cm. high; leaf segments oblong, entire or few-toothed----**30. P. ivesiana.**
Corolla oblong-campanulate to funnelform, 6 to 15 mm. long, blue or white.
Plant conspicuously hispid, 30 to 60 cm. high; leaf segments ovate, incised or serrate----------**9. P. hispida.**
Plant puberulent, glandular above, 7 to 40 cm. high; leaf segments oblong, commonly entire----**33. P. fremontii.**
Stamens exserted.
Corolla lobes dentate or erose. Leaves interruptedly bipinnatifid, the lobes ovate or oblong; plant 20 to 40 cm. high, viscid-villous to glandular-puberulent above----------**8. P. alba.**
Corolla lobes entire or crenulate.

Leaves toothed or lobed halfway to the midrib or less.
Corolla open-campanulate, white or blue; stamens long-exserted; plant 15 to 50 cm. high, glandular-viscid or pilose; leaves ovate-oblong to oblong, crenate or doubly crenate; flowers in crowded spikes----------3. **P. corrugata.**
Corolla narrowly campanulate, white; stamens scarcely exserted; plant 40 to 60 cm. high, erect, glandular-hispid; leaves oblong, dentate; inflorescence an elongate thyrse--5. **P. palmeri.**
Leaves (at least the lower) once or twice pinnatifid.
Leaves more or less densely hispid or pilose all over.
Leaves (the lower) pinnatifid, the lobes ovate, crenulate; upper leaves oval, crenate; corolla purple, broadly campanulate, 5 to 6 mm. long; plant 20 to 30 cm. high, hispid and glandular, branching from the base----------2. **P. crenulata.**
Leaves commonly bipinnatifid, the leaflets or lobes entire or few-toothed; corolla blue, campanulate, 5 to 10 mm. long; plant 60 cm. high or less, sparingly hispid, branching from base----------10. **P. distans.**
Leaves hispid or pilose on the veins, glandular, puberulent, or glabrate.
Plant commonly simple-stemmed, glabrous or glandular, 20 to 30 cm. high; leaf segments oblong to obovate, crenate or lobed; corolla 10 mm. long, blue or purple--7. **P. splendens.**
Plant widely branching from the base, viscid-pubescent, 20 to 70 cm. high; leaf segments oblong to oval, crenate or incised; corolla 5 to 7 mm. long, blue or white.
6. P. glandulosa.

1. Phacelia pedicellata A. Gray, Syn. Fl. **2**[1]: 160. 1878.

Desert areas, canyons, and mountain sides of the Covillea and artemisia belts. Arizona and southern Nevada to California.

2. Phacelia crenulata Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 251. 1871.

Desert areas and dry hillsides of the Covillea and artemisia belts. New Mexico and Utah to Nevada and southern California.

3. Phacelia corrugata A. Nels. Bot. Gaz. **34**: 26. 1902.

Plains and hillsides of the Covillea and artemisia belts. Colorado and Utah, southward to Texas and Mexico.

4. Phacelia orbicularis Rydb. Bull. Torrey Club **40**: 479. 1913.

Pinyon belt; Marvine Laccolite. Utah.

5. Phacelia palmeri Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 251. 1871.

Phacelia foetida Goodding, Bot. Gaz. **37**: 58. 1904.

Arid soil and lava fields of the Covillea belt. Southern Utah, Nevada, and Arizona.

6. Phacelia glandulosa Nutt. Journ. Acad. Phila. II. **1**: 160. 1848.

Pinyon, yellow pine, aspen, and spruce belts. Montana to Utah, Arizona, and Texas.

7. Phacelia splendens Eastw. Zoe **4**: 9. 1893.

Foothills and dry canyons of the artemisia and pinyon belts. Western Colorado and Utah.

8. Phacelia alba Rydb. Bull. Torrey Club **28:** 30. 1901.

Aspen and spruce belts. Wyoming to New Mexico, Utah, and Arizona.

9. Phacelia hispida A. Gray, Syn. Fl. **2**[1]**:** 161. 1878.

Foothills and canyons of the Covillea and artemisia belts. Southern Utah and Arizona to Nevada and southern California.

10. Phacelia distans Benth. Bot. Voy. Sulph. 36. 1844.

Desert areas and dry hillsides of the Covillea and artemisia belts. California and Nevada to Arizona.

11. Phacelia ramosissima Dougl.; Lehm. Pug. **2:** 21. 1830.

Phacelia eremophila Greene, Pittonia **5:** 20. 1902.

Plains, foothills, and canyons of the artemisia and pinyon belts. Washington to California, Nevada, and Arizona.

12. Phacelia suffrutescens Parry, Proc. Davenport Acad. **4:** 38. 1884.

Sand dunes, foothills, and dry canyons of the artemisia and pinyon belts; southeastern California. California and Nevada (?).

13. Phacelia alpina Rydb. Mem. N. Y. Bot. Gard. **1:** 324. 1900.

Aspen and spruce belts. Montana to Wyoming, Utah, and California.

14. Phacelia heterophylla Pursh, Fl. Amer. Sept. 140. 1814.

Pinyon, yellow pine, aspen, and spruce belts. Alberta to British Columbia, southward to New Mexico and California.

15. Phacelia humilis Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **2:** 122. 1855.

Foothills and canyons of the artemisia, pinyon, yellow pine, and aspen belts. California to Nevada and Utah.

16. Phacelia sericea (Graham) A. Gray, Proc. Amer. Acad. **10:** 323. 1875.

Eutoca sericea Graham in Curtis's Bot. Mag. **57:** *pl. 3003.* 1830.

Pinyon, yellow pine, aspen, and spruce belts. Alberta to British Columbia, southward to Colorado and Nevada.

17. Phacelia idahoensis Henderson, Bull. Torrey Club **22:** 48. 1895.

Phacelia ciliosa Rydb. Bull. Torrey Club **33:** 149. 1906.

Pinyon belt and upward to the subalpine belt. Alberta to British Columbia, southward to Colorado and Nevada.

18. Phacelia hydrophylloides Torr.; A. Gray, Proc. Amer. Acad. **7:** 400. 1868.

Mountain sides of the yellow pine belt; Sierra Nevada. Oregon and California to western Nevada.

19. Phacelia linearis (Pursh) Holzinger, Contr. U. S. Nat. Herb. **3:** 242. 1895.

Hydrophyllum lineare Pursh, Fl. Amer. Sept. 134. 1814.

Plains, foothills, and canyons of the artemisia, pinyon, and yellow pine belts. Alberta to British Columbia, southward to Utah and California.

20. Phacelia curvipes Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5:** 252. 1871.

Foothills and canyons of the artemisia and pinyon belts. Southern Utah to California.

21. Phacelia pulchella A. Gray, Proc. Amer. Acad. **10:** 326. 1875.

Hillsides and canyons of the Covillea and artemisia belts. Southern Utah and Nevada.

22. Phacelia cephalotes A. Gray, Proc. Amer. Acad. **10:** 325. 1875.

Hillsides of the Covillea belt. Utah.

23. Phacelia demissa A. Gray, Proc. Amer. Acad. **10:** 326. 1875.
Phacelia nudicaulis Eastw. Zoe. **4:** 123. 1893.
Desert areas and hillsides of the artemisia and pinyon belts. Utah to New Mexico, Arizona, and Nevada.

24. Phacelia lemmoni A. Gray, Syn. Fl. ed. 2. **2**[1]**:** 417. 1886.
Desert areas and canyons of the Covillea belt. Northwestern Arizona to Nevada and southern California.

25. Phacelia saxicola A. Gray, Proc. Amer. Acad. **20:** 304. 1885.
Desert areas and canyons of the Covillea belt. Northwestern Arizona and southern Nevada.

26. Phacelia rotundifolia Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5:** 253. 1871.
Crevices of rocks in desert areas, canyons, and mountain sides of the Covillea and artemisia belts. Southern Utah and Arizona, southern Nevada, and California.

27. Phacelia perityloides Coville, Proc. Biol. Soc. Washington **7:** 75. 1892.
Dry canyons and mountain sides of the artemisia belt. California and southern Nevada.

28. Phacelia glechomaefolia A. Gray, Syn. Fl. ed. 2. **2**[1]**:** 417. 1886.
Canyons and dry hillsides; Grand Canyon. Arizona and southern Utah (?).

29. Phacelia pusilla Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5:** 253. 1871.
Foothills and canyons of the artemisia and pinyon belts. Nevada and eastern California.

30. Phacelia ivesiana Torr. in Ives, Rep. Colo. Riv. 21, 1860.
Desert areas and dry hillsides of the Covillea and artemisia belts. Utah and Arizona to Nevada and southern California.

31. Phacelia affinis A. Gray, Syn. Fl. ed. 2. **2**[1]**:** 417. 1886.
Desert areas and dry hillsides of the Covillea belt. Southwestern Utah to southern and Lower California.

32. Phacelia bicolor Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5:** 255. 1871.
Foothills and canyons of the artemisia, pinyon, yellow pine, and aspen belts. Utah and Arizona, westward to Oregon and California.

33. Phacelia fremontii Torr. in Ives, Rep. Colo. Riv. 21. 1860.
Desert areas, foothills, and canyons of the Covillea, artemisia, and pinyon belts. Southern Utah and Arizona to Nevada and southern California.

34. Phacelia gymnoclada Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5:** 255. 1871.
Valleys, foothills, and canyons of the artemisia and pinyon belts. Nevada and California.

35. Phacelia crassifolia Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5:** 255. 1871.
Valleys of the artemisia belt. Nevada.

36. Phacelia pachyphylla A. Gray, Proc. Amer. Acad. **19:** 88. 1883.
Phacelia neglecta Jones, Contr. West. Bot. **12:** 50. 1908.
Desert areas of the Covillea belt. Southern California and Nevada.

37. **Phacelia calthifolia** Brand, Beitr. Hydroph. 8. 1911; in Engl. Pflanzenr. IV. 251: 129. 1913.

Desert areas and dry canyons of the Covillea belt. Southern California and Nevada.

5. EMMENANTHE Benth.

Plant glabrous, diffuse, the stems 20 cm. long or less. Leaves oblong-spatulate, entire or few-toothed, opposite above, 1 to 3 cm. long; corolla campanulate, 3 to 4 mm. long ..... 5. E. glaberrima.

Plants not glabrous.

Corolla 9 mm. long, campanulate. Leaves linear-oblong, entire, dentate, or pinnatifid, 3 cm. long or more; plant villous-hirsute and glandular, 10 to 60 cm. high, erect, simple or branching ..... 1. E. penduliflora.

Corolla 2 to 6 mm. long.

Corolla 2 mm. long, campanulate. Plant low, pilose; stems short, filiform; leaves oblong or spatulate, entire or nearly so ..... 7. E. pusilla.

Corolla 3 to 6 mm. long.

Corolla 5 to 6 mm. long, surpassing the calyx. Plants diffusely branched from the base, glandular-viscid and puberulent.

Leaves entire or few-toothed, oblong-spatulate or lanceolate. 2. E. lutea.

Leaves pinnatifid, the lobes ovate, obtuse ..... 3. E. glandulifera.

Corolla about equaling the (3 to 4 mm. long) calyx.

Leaves long-petioled, oblong, toothed or entire; plant branched, 2 to 5 cm. high, glandular-puberulent; style equaling the ovary. 4. E. foliosa.

Leaves long-petioled, obovate or oblong, pinnatifid; plant diffusely branched, densely pubescent and viscid, the stems 20 cm. long or less; style half as long as the ovary ..... 6. E. parviflora.

1. **Emmenanthe penduliflora** Benth. Trans. Linn. Soc. Bot. **17**: 281. 1835.

Desert areas, canyons, and mountain sides of the Covillea and artemisia belts. Utah to Arizona and California.

2. **Emmenanthe lutea** (Hook. & Arn.) A. Gray, Proc. Amer. Acad. **10**: 328. 1875.

Eutoca lutea Hook. & Arn. Bot. Beechey Voy. 373. 1840.

Foothills of the artemisia, pinyon, and yellow pine belts. Southern Oregon to western Nevada and California.

3. **Emmenanthe glandulifera** Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 257. 1871.

Foothills of the artemisia belt. Nevada and California.

4. **Emmenanthe foliosa** Jones, Zoe **4**: 278. 1893.

Alkaline areas of the artemisia belt; Deep Creek, Utah.

5. **Emmenanthe glaberrima** Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 257. 1871.

Valleys and on hillsides of the artemisia belt. Nevada.

6. **Emmenanthe parviflora** A. Gray, U. S. Rep. Expl. Miss. Pacif. **6**: 85. *pl. 15*. 1857.

Artemisia plains. Southeastern Oregon and Nevada.

7. **Emmenanthe pusilla** A. Gray, Proc. Amer. Acad. **11**: 87. 1876.

Alkaline plains. Oregon, Nevada, and California.

6. CONANTHUS S. Wats.

Styles united; corolla funnelform, purple, 9 to 15 mm. long; leaves linear-lanceolate; plant 5 to 10 cm. high, pilose-hispid_____1. C. aretioides.
Styles free; corolla narrowly campanulate, 9 to 14 mm. long. violet-purple; leaves linear; plant 3 to 12 cm. high, hirsute-pubescent____2. C. demissus.

1. Conanthus aretioides (Hook. & Arn.) Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 256. 1871.

Eutoca aretioides Hook. & Arn. Bot. Beechey Voy. 374. 1845.

Conanthus multiflorus Heller, Muhlenbergia **2**: 238. 1906.

Plains and dry hillsides of the artemisia and pinyon belts. Wyoming to Arizona, westward to Oregon and California.

2. Conanthus demissus (A. Gray) Heller, Cat. N. Amer. Pl. 6. 1898.

Nama demissa A. Gray, Proc. Amer. Acad. **8**: 283. 1870.

Desert areas and dry hillsides of the Covillea and artemisia belts. Utah and Arizona to Nevada and California.

7. TRICARDIA Torr.

1. Tricardia watsoni Torr.; Wats. in King, Geol. Expl. 40th Par. **5**: 258. *pl. 24.* 1871.

Dry canyons and mountain sides of the artemisia, pinyon, and yellow pine belts. Utah and Nevada to southern California.

8. CAPNOREA Raf.

Corolla rotate or saucer-shaped, purplish to nearly white; leaves glabrous or nearly so_____1. C. pumila.
Corolla campanulate, lilac-purple; leaves puberulent_____2. C. watsoniana.

1. Capnorea pumila (Dougl.) Greene, Erythea **2**: 193. 1894.

Villarsia pumila Dougl.; Griseb. in Hook. Fl. Bor. Amer. **2**: 70. *pl. 157, B.* 1838.

Wet sunny places of the artemisia belt. Washington to Oregon, Idaho, and Utah (?).

2. Capnorea watsoniana Greene, Pittonia **5**: 44. 1902.

Hesperochiron californicus S. Wats. in King, Geol. Expl. 40th Par. **5**: 281. *pl. 30.* 1871. Not *Ourisia californica* Benth.

Wet meadows and canyons of the artemisia, pinyon, and yellow pine belts. Utah to California.

9. ERIODICTYON Benth.

Leaves glabrous above, white-woolly beneath, linear, revolute, 4 to 8 cm. long; corolla about 6 mm. long; shrub 1 to 3 meters high__1. E. angustifolium.
Leaves more or less woolly on both faces, linear to lanceolate, 2 to 5 cm. long; corolla funnelform, 10 mm. long; undershrub 10 to 20 cm. high, woolly-sericeous_____2. E. lobbii.

1. Eriodictyon angustifolium Nutt. Journ. Acad. Phila. II. **1**: 181. 1848.

Rocky canyons and mountain sides of the artemisia and pinyon belts. Utah and Arizona to Nevada and California.

2. Eriodictyon lobbii Greene, Bull. Calif. Acad. **1**: 202. 1885.

Lava beds, in canyons, and hillsides of the artemisia, pinyon, and yellow pine belts. California and western Nevada.

110. BORAGINACEAE. Borage Family

Annual, biennial, or perennial herbs, usually with a scabrous or hispid pubescence; leaves estipulate, alternate or opposite; inflorescence mostly scorploid; flowers perfect, 5-merous; calyx mostly deeply cleft; stamens adnate to the corolla tube; style 1; ovary deeply 4-lobed; fruit of 2 or 4 seedlike nutlets.

Nutlets with hooked prickles.

Plants small, diffusely branched. Leaves narrowly linear, strigose; flowers minute, white, scattered; nutlets flat, winged or with a laciniate border. **4. PECTOCARYA.**

Plants more or less robust.

Corolla purple, funnelform, the throat closed by 5 scales; nutlets horizontally radiate, covered with prickles; stout biennials; leaves lanceolate or oblong; flowers bractless, racemose_____**5. CYNOGLOSSUM.**

Corolla blue or white, salverform, the throat closed by fornicate appendages; nutlets erect or nearly so, the margin or back covered with prickles; hirsute or pubescent herbs with narrow leaves. **6. LAPPULA.**

Nutlets unarmed.

Plants dichotomously branched.

Plants mostly suffruticose perennials (*Coldenia nuttallii* annual) with alternate or fascicled leaves. Flowers white, axillary, solitary or in clusters; stamens included; style 2-cleft; ovary 4-celled, separating into 4 nutlets_____**1. COLDENIA.**

Plants annual with linear leaves. Flowers white, minute, corolla tubular, with short limb; nutlets smooth, oblong-ovate.

Calyx wholly persistent; corolla with appendages; plants low, openly branched, strigose to canescent-hirsute; flowers in capitate clusters. **9. EREMOCARYA.**

Calyx circumscissile; corolla without appendages; plants low, intricately branched_____**10. GREENEOCHARIS.**

Plants not dichotomously branched.

Plants glabrous or nearly so.

Flowers in scorploid racemes; corolla white, tinged with blue, salverform.

Glaucous perennial; leaves spatulate, 2 to 5 cm. long; styles united; nutlets scarcely rugose_____**2. HELIOTROPIUM.**

Flowers in racemes or panicles; corolla blue or purple, tubular-funnelform_____**20. MERTENSIA.**

Plants pubescent or hirsute.

Plants annual (one species of *Allocarya* perennial).

Flowers solitary and axillary. Corolla salverform, large, white, the tube cylindric; ovary 4-celled; style elongate; fruit of 2 1-seeded nutlets; plants branching from the base, strigose-hirsute; leaves ovate to linear_____**3. EUPLOCA.**

Flowers in racemes, panicles, cymes, or thyrses.

Flowers in scorploid racemes. Corolla salverform or funnelform, white, the tube short; racemes mostly bracted in one species.

Leaves (at least some) opposite, linear; pedicels turbinate beneath the calyx, persistent, becoming indurate____**8. ALLOCARYA.**

Leaves alternate, linear to oblanceolate; pedicels filiform, persistent.

Calyx 5-lobed, persistent; nutlets attached by the middle. **11. PLAGIOBOTHRYS.**

Calyx 5-lobed, usually deciduous; nutlets attached from the base upward to or above the middle_____14. CRYPTANTHE.
Flowers glomerate or paniculate-racemose.
Calyx large, foliaceous, reticulate, the lobes 10 (5 large alternating with 5 small). Leaves spatulate to oblong; nutlets granular-tuberculate; plant low, hispid; flowers axillary.
16. ASPERUGO.
Calyx commonly not foliaceous, not at all reticulate, the lobes 5.
Plant robust, 40 cm. high or more, hispid. Leaves ovate or oblanceolate, clasping or stalked; calyx lobes linear, 8 to 10 mm. long, hispid with white hairs; corolla blue, the lobes lanceolate_____18. BORAGO.
Plants 30 cm. high or less.
Flowers in bractless racemes_____19. MYOSOTIS.
Flowers glomerate or in bracted racemes.
Flowers glomerate_____12. SONNEA.
Flowers in bracted racemes_____21. LITHOSPERMUM.
Biennials or perennials.
Corolla yellow, greenish yellow, or orange. Receptacle flat to pyramidal.
Corolla tubular, 1 cm. long, the lobes erect. Stamens included; style long-exserted; nutlets ovoid, attached by the base; stem 30 to 60 cm. high or more, hispid; leaves oblong-lanceolate, prominently 5 to 7-ribbed_____22. ONOSMODIUM.
Corolla salverform.
Hispid biennials; corolla 5 to 10 mm. long; nutlets rugose or tuberculate_____15. AMSINCKIA.
Canescent, strigose or hispid perennials; corolla 10 to 25 mm. long; nutlets white, smooth, or brown and somewhat rugose.
21. LITHOSPERMUM.
Corolla blue, purple, or white.
Plants 1 to 10 cm. high, silky-villous, pulvinate-cespitose; leaves overlapping, oblong or oblanceolate to linear above; corolla rotate, blue_____7. ERITRICHUM.
Plants 10 to 100 cm. high (mostly over 20 cm. high).
Corolla funnelform, oblique, the lobes unequal. Stamens unequal, exserted; nutlets ovoid, reticulate-rugose; coarse hispid plant with lanceolate leaves_____23. ECHIUM.
Corolla regular.
Flowers distinctly leafy-bracted.
Flowers crowded in paniculate or thyrsoid clusters.
13. OREOCARYA.
Flowers in scorpioid racemes. Corolla blue or purple, 1 cm. long; nutlets rugose, exserted, on a flat receptacle; hispid plant with oblanceolate or lanceolate leaves.
17. ANCHUSA.
Flowers with very small bracts, or these wanting.
Corolla salverform, the tube short; nutlets ovoid, small, attached by the base; hirsute, caulescent herbs with narrow leaves; racemes in fruit elongate____19. MYOSOTIS.
Corolla tubular-funnelform. Flowers in racemes or panicles; nutlets attached near the base on a convex receptacle.
20. MERTENSIA.

1. COLDENIA L.

Leaves rigid, lanceolate to linear, revolute; flowers solitary, 5 to 6 mm. long; corolla not appendaged; calyx lobes linear; nutlets rounded; plant procumbent, very hispid ..... 1. C. hispidissima.
Leaves rhombic, rounded, or ovate; flowers clustered in the forks; corolla appendaged within; calyx lobes linear; plants prostrate or procumbent, canescent and hispid.
  Leaves ovate or oblong, sericeous or tomentose, petioled, 25 mm. long or less, obscurely veined ..... 2. C. canescens.
  Leaves rounded or rhombic, petioled, distinctly veined.
    Canescent and hispid annual ..... 3. C. nuttallii.
    Canescent perennial ..... 4. C. palmeri.

1. **Coldenia hispidissima** (Torr.) A. Gray, Proc. Amer. Acad. **5**: 340. 1862.
Eddya hispidissima Torr. U. S. Rep. Expl. Miss. Pacif. **2**: 170. *pl. 9*. 1855.
Covillea and artemisia belts. Western Texas to Nevada and Arizona.

2. **Coldenia canescens** DC. Prodr. **9**: 559. 1845.
Stegnocarpus canescens Torr. U. S. Rep. Expl. Miss. Pacif. **2**: 169. *pl.* 7. 1855.
Covillea and lower artemisia belts. Western Texas to southern Nevada and Arizona.

3. **Coldenia nuttallii** Hook. Journ. Bot. Kew Misc. **3**: 296. 1851.
Plains and hillsides of the artemisia belt. Washington to California, eastward to Wyoming and Arizona.

4. **Coldenia palmeri** A. Gray, Proc. Amer. Acad. **8**: 292. 1870.
Desert areas of the Covillea belt. Arizona and southern Nevada, southward to Mexico.

2. HELIOTROPIUM L. Heliotrope

1. **Heliotropium xerophilum** Cockerell, Bot. Gaz. **33**: 379. 1902.
Heliotropium spathulatum Rydb. Bull. Torrey Club **30**: 262. 1903.
Alkaline soil of the Covillea and artemisia belts. Saskatchewan to Washington, southward to Mexico.

3. EUPLOCA Nutt.

1. **Euploca convolvulacea** Nutt. Trans. Amer. Phil. Soc. n. ser. **5**: 189. 1837.
Plains, hillsides, and canyons of the Covillea and artemisia belts; along San Juan River. Nebraska to southern Utah and California, southward to Mexico.

4. PECTOCARYA DC.

Nutlets obovate, the margin entire ..... 1. P. setosa.
Nutlets oblong, the margin undulate or laciniate.
  Wing of the nutlets toothed, the teeth ending with an uncinate bristle. 2. P. linearis.
  Wing of the nutlets undulate, revolute, beset with slender bristles. 3. P. penicillata.

1. **Pectocarya setosa** A. Gray, Proc. Amer. Acad. **12**: 81. 1876.
Plains, canyons, and hillsides of the Covillea and artemisia belts. Idaho and Oregon, southward to Arizona and California.

2. **Pectocarya linearis** (Ruiz & Pav.) A. DC. Prodr. **10**: 120. 1846.
Cynoglossum lineare Ruiz & Pav. Fl. Peruv. Chil. **2**: 6. 1799.

Pectocarya gracilis platycarpa Munz & Johnst. Contr. Gray Herb. n. ser. 70: 36. 1924.

Desert areas and dry hillsides of the Covillea belt. Southwestern Utah and Arizona, westward to southern California.

3. Pectocarya penicillata (Hook. & Arn.) A. DC. Prodr. **10**: 120. 1846.

Cynoglossum penicillatum Hook. & Arn. Bot. Beechey Voy. 371. 1840.

Pectocarya penicillata heterocarpa Munz & Johnst. Contr. Gray Herb. n. ser. 70: 37. 1924.

Desert areas and mountain sides of the Covillea and artemisia belts. British Columbia to California, Nevada, and Arizona.

5. CYNOGLOSSUM L. HOUNDSTONGUE

Leaves soft-hairy, lanceolate, mostly acute or acuminate_____1. **C. officinale.**
Leaves hirsute, oblong or oblanceolate, mostly obtuse or acutish.
2. C. occidentale.

1. Cynoglossum officinale L. Sp. Pl. 134. 1753.

Waste places; introduced from Europe. Quebec to North Carolina, westward to Montana and Utah.

2. Cynoglossum occidentale A. Gray, Proc. Amer. Acad. **10**: 58. 1874.

Moist ground of the yellow pine and aspen belts. Oregon and California to western Nevada.

6. LAPPULA Moench. STICKSEED

Racemes not leafy, except at base; biennials or perennials.
Corolla funnelform, the tube surpassing the calyx. Nutlets 6 mm. long, muricate and with prickles on the back, the slender prickles nearly free; plant sparingly pilose to softly hirsute; leaves spatulate to oblong-lanceolate_____1. **L. diffusa.**
Corolla rotate, the tube not surpassing the calyx.
Corolla 4 to 6 mm. broad, the swellings in the throat glabrous. Nutlets slightly ridged or muricate, not prickly on the back, the slender prickles numerous, subulate; plant 30 to 100 cm. high, pilose or hirsute; leaves oblanceolate to linear_____2. **L. floribunda.**
Corolla 8 to 10 mm. broad, the swellings in the throat pubescent. Plants 30 to 70 cm. high; leaves oblanceolate or spatulate.
Plant strigose-pubescent; nutlets finely muricate with few nearly free prickles_____3. **L. coerulescens.**
Plant softly hirsute; nutlets finely muricate with numerous nearly free prickles_____4. **L. subdecumbens.**
Racemes leafy-bracted; annuals, biennials, or perennials.
Marginal prickles of the nutlets united for about half their length into a cupulate base. Canescent to softly pilose annual; leaves spatulate to linear; flowers light blue to whitish_____5. **L. texana.**
Marginal prickles of the nutlets free or slightly united at base.
Prickles terete or nearly so; annual 20 to 60 cm. high, hirsute; leaves spatulate to lineat; flowers blue_____6. **L. occidentalis.**
Prickles flattened at the base; annual 20 to 40 cm. high, densely and softly pilose; leaves oblanceolate to linear; flowers white__7. **L. leucotricha.**

1. Lappula diffusa (Lehm.) Greene, Pittonia **2**: 182. 1891.

Echinospermum diffusum Lehm. Nov. Stirp. Pugill. **2**: 23. 1830.

Aspen and spruce belts. British Columbia to California, eastward to Montana and Utah.

2. Lappula floribunda (Lehm.) Greene, Pittonia **2**: 182. 1891.
Echinospermum floribundum Lehm. Nov. Stirp. Pugill. **2**: 24. 1830.
Foothills, canyons, and mountain sides of the artemisia belt, upward to the spruce belt. Manitoba to New Mexico, westward to British Columbia and California.

3. Lappula coerulescens Rydb. Mem. N. Y. Bot. Gard. **1**: 328. 1900.
Foothills, canyons, and mountain sides of the pinyon, yellow pine, and aspen belts. Alberta to Wyoming, Utah, and Nevada.

4. Lappula subdecumbens (Parry) A. Nels. in Coulter, New Man. Rocky Mount. 412. 1909.
Echinospermum subdecumbens Parry, Proc. Davenport Acad. **1**: 148. 1876.
Aspen belt. Idaho to Utah and Nevada.

5. Lappula texana (Scheele) Greene, Pittonia **4**: 94. 1899.
Echinospermum texanum Scheele, Linnaea **25**: 260. 1852.
? Lappula desertorum Greene, Pittonia **4**: 95. 1899.
Plains and sandy hillsides of the Covillea and artemisia belts. South Dakota to Texas, westward to Washington and Nevada.

6. Lappula occidentalis (S. Wats.) Greene, Pittonia **4**: 97. 1899.
Echinospermum redowskii occidentale S. Wats. in King, Geol. Expl. 40th Par. **5**: 246. 1871.
Plains, canyons, and mountain sides of the artemisia and pinyon belts. Saskatchewan to New Mexico, westward to California and Alaska.

7. Lappula leucotricha Rydb. Bull. Torrey Club **36**: 676. 1909.
Plains and hillsides of the Covillea, artemisia, and pinyon belts. Southern Utah and Arizona.

7. ERITRICHUM Schrad.

Dorsal face of the nutlet with a winglike entire margin_____**1. E. elongatum.**
Dorsal face of the nutlet with a pectinate margin_____**2. E. argenteum.**

1. Eritrichum elongatum (Rydb.) W. F. Wight, Bull. Torrey Club **29**: 408. 1902.
Eritrichum aretioides elongatum Rydb. Mem. N. Y. Bot. Gard. **1**: 337. 1900.
Spruce and alpine belts. Montana to New Mexico and Oregon.

2. Eritrichum argenteum W. F. Wight, Bull. Torrey Club **29**: 411. 1902.
Alpine belt; Uintah Mountains. Colorado and Utah.

8. ALLOCARYA Greene

Plants perennial, sometimes rooting at the nodes, densely soft-villous; corolla 6 to 8 mm. broad. Nutlets trigonous-ovate, rugose-areolate; leaves linear-ligulate, 2 cm. long or more_____**1. A. mollis.**
Plants annual; corolla 1 to 3 mm. broad.
Nutlets armed with fine bristles on the ridges.
Nutlets somewhat lanceolate, granulate and rugulose. Calyx accrescent in fruit; plants simple or sparingly branched; branches 10 to 60 cm. long.
Corolla conspicuous; nutlets 4 times as long as broad, the bristles mostly not barbed; leaves glabrous or sparingly strigillose.
2. A. leptoclada.
Corolla minute; nutlets 2 to 3 times as long as broad, the bristles barbed at tip; leaves glabrous above, strigillose beneath____**3. A. asperula.**

Nutlets ovoid, granulate. Corolla 1 to 2 mm. broad.
Leaves glabrous or nearly so above, strigillose beneath. Plant branched from the base, the branches 30 cm. long or less; scar on nutlet narrowly pyriform, suprabasal, one-fifth as long at the nutlet.
6. A. ramosa.

Leaves more or less strigillose on both faces.
Plant diffusely branched; scar on nutlet ovate, the glochidia sessile.
5. A. hispidula.

Plant erect, slender, sparingly branched; scar on nutlet linear to lanceolate, the glochidia stalked----------**7. A. penicillata.**

Nutlets unarmed.
Nutlets somewhat lanceolate, rugose and tuberculate, the scar basal.
Plant 10 to 25 cm. high, simple or with few branches, glabrous or sparingly strigose; racemes strict----------**4. A. orthocarpa.**

Nutlets ovoid, the scar suprabasal.
Nutlets muriculate and rugose. Plant diffusely branching from the base, strigose----------**8. A. californica.**

Nutlets not muriculate.
Pubescence on stem spreading; plants branching from the base.
Stems more or less densely hispid, 1 to 1.5 mm. in diameter; flowers densely crowded----------**10. A. salsa.**

Stems sparingly hispid, rarely over 0.5 mm. in diameter; flowers not crowded----------**11. A. jucunda.**

Pubescence on stem strigillose; plants prostrate, diffusely branching.
Nutlets not at all granulate. Racemes leafy-bracted--**9. A. nitens.**

Nutlets rugulose or granulate or both.
Racemes more or less leafy----------**12. A. cusickii.**

Racemes with few or no leaves----------**13. A. cognata.**

1. Allocarya mollis (A. Gray) Greene, Pittonia 1: 20. 1887.
Eritrichum molle A. Gray, Proc. Amer. Acad. 19: 89. 1883.
Alkaline borders of ponds of the artemisia belt. Oregon and California to Nevada.

2. Allocarya leptoclada Greene, Pittonia 3: 109. 1896.
Artemisia belt. Nevada and Utah.

3. Allocarya asperula Piper, Contr. U. S. Nat. Herb. 22: 93. 1920.
Valleys and canyons of the artemisia and pinyon belts. Saskatchewan to Wyoming and Nevada.

4. Allocarya orthocarpa Greene, Pittonia 4: 235. 1901.
Valleys and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Montana to Colorado, Utah, and Washington.

5. Allocarya hispidula Greene, Pittonia 1: 17. 1887.
Valleys and slopes of the artemisia, pinyon, and yellow pine belts. Washington to Idaho, Nevada, and California.

6. Allocarya ramosa Piper, Contr. U. S. Nat. Herb. 22: 100. 1920.
Meadows and slopes of the artemisia, pinyon, yellow pine, and aspen belts. Washington to Oregon, Idaho, and Utah.

7. Allocarya penicillata Greene, Pittonia 1: 18. 1887.
Yellow pine belt. California and Nevada.

8. Allocarya californica (Fisch. & Mey.) Greene, Pittonia **1**: 20. 1887.
Myosotis californica Fisch. & Mey. Ind. Sem. Hort. Petrop. **1835**: 17. 1835.
Artemisia belt and upward to the spruce belt. North Dakota to New Mexico, westward to Alaska and California.

9. Allocarya nitens Greene, Pittonia **3**: 108. 1896.
Artemisia belt. Utah and Nevada.

10. Allocarya salsa T. S. Brandeg. Bot. Gaz. **27**: 452. 1899.
Alkaline soil; Twin Springs, Nevada.

11. Allocarya jucunda Piper, Bull. Torrey Club **29**: 643. 1902.
Artemisia belt. Oregon and Nevada.

12. Allocarya cusickii Greene, Pittonia **1**: 17. 1887.
Valleys of the artemisia belt. Utah to California and Washington.

13. Allocarya cognata Greene, Pittonia **4**: 235. 1901.
Wet meadows of the artemisia belt. Wyoming to Colorado, Utah, and Nevada.

9. EREMOCARYA Greene

1. Eremocarya micrantha (Torr.) Greene, Pittonia **1**: 59. 1887.
Eritrichum micranthum Torr. U. S. & Mex. Bound. Bot. 141. 1859.
Plains and hillsides of the Covillea, artemisia, and pinyon belts. Texas to Utah and California.

10. GREENEOCHARIS Gürke & Harms

Stems hirsute with somewhat appressed hairs_____**1. G. circumscissa.**
Stems pilose with spreading or divergent hairs_____**2. G. dichotoma.**

1. Greeneocharis circumscissa (Hook. & Arn.) Rydb. Bull. Torrey Club **36**: 677. 1909.
Lithospermum circumscissum Hook. & Arn. Bot. Beechey Voy. 370. 1840.
Plains and hillsides of the Covillea and artemisia belts. Wyoming to Arizona, westward to Washington and California.

2. Greeneocharis dichotoma (Greene) Tidestrom.
Krynitzkia dichotoma Greene, Bull. Calif. Acad. **1**: 206. 1885.
Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Western Nevada and California.

11. PLAGIOBOTHRYS Fisch. & Mey.

Stem leaves usually much reduced; nutlets wrinkled, contracted at both ends.
1. P. tenellus.
Stem leaves not much reduced, lanceolate; nutlets rugose, broadly ovate.
2. P. arizonicus.

1. Plagiobothrys tenellus (Nutt.) A. Gray, Proc. Amer. Acad. **20**: 283. 1885.
Myosotis tenella Nutt. Journ. Bot. Kew Misc. **3**: 295. 1851.
Artemisia belt. British Columbia to Idaho, Nevada, and California.

2. Plagiobothrys arizonicus (A. Gray) Greene; A. Gray, Proc. Amer. Acad. **20**: 284. 1885.
Eritrichum canescens arizonicum A. Gray, Proc. Amer. Acad. **17**: 227. 1882.
Plains and hillsides of the Covillea belt. Southwestern New Mexico to southern Nevada and California.

12. SONNEA Greene

Nutlets commonly 4, amsinckioid, trigonous, the elongate caruncle extending along the crest of the medial ventral keel.
Nutlets conspicuously tessellate; flowers less than 3 mm. wide__1. S. jonesii.
Nutlets not tessellate, irregular, rugose; flowers over 3 mm. wide.
Plants erect, 20 cm. high; inflorescence elongate and remotely flowered. 2. S. kingii.
Plants more or less spreading, about 10 cm. high; inflorescence glomerate or but little elongate_____3. S. harknessii.
Nutlets commonly 1 or 2, not amsinckioid, ovate or ovoid; caruncle not elongate, soft and fragile, at or above the middle of the nutlet.
Nutlets light-colored and somewhat shiny, nearly smooth, 2.5 to 3 mm. long. 4. S. glomerata.
Nutlets dark, dull, with conspicuous rugose and tubeculate roughenings, 1.5 to 2.5 mm. long.
Nutlets 1.5 to 2 mm. long, abundantly rugose; caruncle centrally placed. 5. S. hispida.
Nutlets 2 to 2.5 mm. long, very sparsely rugose; caruncle placed conspicuously above the middle of the nutlet_____6. S. foliacea.

1. **Sonnea jonesii** (A. Gray) Greene, Pittonia 1: 23. 1887.
Plagiobothrys jonesii A. Gray, Syn. Fl. ed. 2. 2[1]: 430. 1886.
Covillea and artemisia belts. Nevada and southern California.

2. **Sonnea kingii** (S. Wats.) Greene, Pittonia 1: 23. 1887.
Eritrichum kingii S. Wats. in King, Geol. Expl. 40th Par. 5: 243. *pl. 23, f. 3–5.* 1871.
Artemisia belt. Western Nevada and adjacent California.

3. **Sonnea harknessii** Greene, Pittonia 1: 23. 1887.
Artemisia and yellow pine belts; Sierra Nevada. Oregon and Calforna to Nevada and Utah.

4. **Sonnea glomerata** (A. Gray) Greene, Pittonia 1: 22. 1887.
Plagiobothrys glomeratus A. Gray, Proc. Amer. Acad. 20: 286. 1885.
Artemisia and pinyon belts. Western Nevada.

5. **Sonnea hispida** (A. Gray) Greene, Pittonia 1: 22. 1887.
Plagiobothrys hispidus A. Gray, Proc. Amer. Acad. 20: 286. 1885.
Artemisia and yellow pine belts. Western Nevada, California, and Oregon.

6. **Sonnea foliacea** Greene, Pittonia 1: 222. 1888.
Yellow pine belt. Western Nevada.

13. OREOCARYA Greene

Leaves glabrous or nearly so beneath, linear to linear-lanceolate, 3 to 10 cm. long. Corolla tube equaling the calyx; plant 30 to 50 cm. high, pubescent above_____17. O. pustulosa.
Leaves pubescent on both faces.
Leaves (at least the lowest) subtomentose and more or less hispid, the bristles often appressed.
Plants 45 to 80 cm. high. Leaves mostly linear-oblanceolate to spatulate, 7 to 20 cm. long; corolla tube not exserted; inflorescence elongate.
Branches of inflorescence elongate; nutlets muricate, winged. 1. O. setosissima.
Branches of inflorescence short, glomerate; nutlets acute-margined, tuberculate, rugose_____2. O. elata.

Plants commonly low and cespitose, if tall, not over 40 cm. high. Corolla not exserted; nutlets roughened.
Bristles often without conspicuous pustulate bases; leaves spatulate, the petioles long-hairy; nutlets tuberculate----------9. O. depressa.
Bristles with conspicuous pustulate bases; leaves 6 to 10 cm. long.
Inflorescence open.
Leaves oblanceolate; nutlets winged and narrowly ridged.
4. O. virginensis.
Leaves linear-oblanceolate; nutlets smooth and shining.
15. O. multicaulis.
Inflorescence narrow.
Plant grayish; leaves subtending the lower racemes reduced; nutlets somewhat rugose----------8. O. interrupta.
Plant yellowish green; leaves subtending the racemes conspicuous; nutlets margined, muriculate----------12. O. commixta.
Leaves canescent or strigose and more or less hispid.
Leaves linear to linear-oblanceolate.
Inflorescence narrow, interrupted; leaves 5 to 10 cm. long, silky-strigose, sparingly hispid; calyx accrescent in fruit; corolla exserted; nutlets smooth, brown----------25. O. confertiflora.
Inflorescence broad, open, the flowers thyrsoid-glomerate or in axillary and terminal racemes; leaves elongate, 4 to 12 cm. long; corolla 6 mm. long or less, not exserted; nutlets smooth.
Stems erect or ascending, the inflorescence exceeding the leaves.
13. O. suffruticosa.
Stems decumbent, the leaves nearly equaling the inflorescence.
14. O. abortiva.
Leaves spatulate, oblanceolate or broader.
Corolla not exserted or only slightly so.
Plants 30 to 40 cm. high, scarcely or not at all cespitose. Leaves spatulate or oblanceolate, 3 to 5 cm. long.
Flowers in axillary and terminal panicled racemes; calyx in fruit 7 to 8 mm. long; nutlets carinate, rugose, muriculate.
3. O. insolita.
Flowers thyrsoid-glomerate, in an open thyrse; calyx in fruit 5 to 6 mm. long; nutlets papillose, with few cross-ridges.
5. O. argentea.
Plants 20 cm. high or less, mostly low and cespitose.
Nutlets smooth or nearly so. Leaves linear-oblanceolate to linear, silvery-cinerous; corolla 5 to 7 mm. broad----16. O. cinerea.
Nutlets not smooth.
Nutlets rugose or muricate.
Corolla tube not at all exserted; nutlets rugose and ridged on the back; leaves oblanceolate to linear above; plant often 25 cm. high----------6. O. sericea.
Corolla tube slightly exserted; nutlets muricate-papillose, setulose on the sides; leaves spatulate or oblanceolate; plant about 15 cm. high----------7. O. echinoides.
Nutlets tuberculate.
Leaves spatulate, about 2 cm. long, strigose and white-hispid.
10. O. shantzii.
Leaves spatulate, about 3 cm. long, canescent or subtomentose, soft-hirsute----------11. O. dolosa.

Corolla exserted, 10 to 18 mm. long.
Inflorescence open (at least in fruit), the branches elongate; corolla 12 to 18 mm. long.
Limb of corolla about 6 mm. wide. Nutlets mostly solitary, finely rugose; plant 10 to 30 cm. high, commonly not cespitose; leaves oblanceolate, silvery-silky----------18. O. nitida.
Limb of corolla 7 to 9 mm. wide.
Calyx accrescent, 15 to 18 mm. long in fruit; nutlets ovate, transversely rugose, papillose near the margin; leaves spatulate to linear above; plant 10 to 20 cm. high----19. O. longiflora.
Calyx scarcely accrescent, about 10 mm. long in fruit; nutlets ovate-oblong, irregularly rugose; leaves mostly spatulate; plant 10 to 30 cm. high----------20. O. wetherillii.
Inflorescence narrow, compact; corolla 10 to 15 mm. long.
Limb of the corolla about 5 mm. wide. Nutlets rugose.
Plant sparingly hispid; leaves spatulate, 4 to 5 cm. long.
22. O. eulophus.
Plant strongly setose-hispid; leaves spatulate, 3 cm. long or less.
23. O. horridula.
Limb of the corolla 7 to 9 mm. wide. Plants 10 to 20 cm. high.
Leaves oblanceolate to linear; corolla white; nutlets ovate, muriculate----------21. O. shockleyi.
Leaves spatulate or oblanceolate; corolla yellow or with a yellow throat; nutlets ovate, papillose----------24. O. flavoculata.

1. **Oreocarya setosissima** (A. Gray) Greene, Pittonia **1**: 58. 1887.
Eritrichum setosissimum A. Gray, Proc. Amer. Acad. **12**: 81. 1877.
Yellow pine, aspen, and spruce belts. Southern Utah and Arizona.

2. **Oreocarya elata** Eastw. Bull. Torrey Club **30**: 241. 1903.
Artemisia belt; Grand Junction, Colorado.

3. **Oreocarya insolita** Macbr. Contr. Gray Herb. n. ser. **48**: 28. 1916.
Covillea and artemisia belts. Nevada.

4. **Oreocarya virginensis** (Jones) Macbr. Proc. Amer. Acad. **51**: 547. 1916.
Krynitzkia glomerata virginensis Jones, Contr. West. Bot. **13**: 5. 1910.
Artemisia and pinyon belts. Southern Utah and Arizona.

5. **Oreocarya argentea** Rydb. Bull. Torrey Club **31**: 637. 1905.
Artemisia and pinyon belts. Colorado and Utah.

6. **Oreocarya sericea** (A. Gray) Greene, Pittonia **1**: 58. 1887.
Krynitzkia sericea A. Gray, Proc. Amer. Acad. **20**: 279. 1885.
Yellow pine belt. Montana to Utah.

7. **Oreocarya echinoides** (Jones) Macbr. Contr. Gray Herb. n. ser. **48**: 31. 1916.
Krynitzkia echinoides Jones, Proc. Calif. Acad. II. **5**: 709. 1895.
Oreocarya hispida Nels. & Kennedy, Proc. Biol. Soc. Washington **19**: 156. 1906.
Yellow pine belt. Utah to California.

8. **Oreocarya interrupta** Greene, Pittonia **3**: 111. 1896.
Artemisia and pinyon belts. Nevada and Idaho.

9. **Oreocarya depressa** (Jones) Macbr. Contr. Gray Herb. n. ser. **48**: 32. 1916.
Krynitzkia depressa Jones, Contr. West. Bot. **13**: 5. 1910.
Pinyon belt. Southern Utah and Nevada.

10. **Oreocarya shantzii** Tidestrom, Proc. Biol. Soc. Washington **26**: 122. 1913.
Desert areas of the artemisia belt. Utah.

11. Oreocarya dolosa Macbr. Contr. Gray Herb. n. ser. **48**: 32. 1916.
Artemisia belt. Utah.

12. Oreocarya commixta Macbr. Contr. Gray Herb. n. ser. **48**: 33. 1916.
Yellow pine belt. Utah and Nevada.

13. Oreocarya suffruticosa (Torr.) Greene, Pittonia **1**: 57. 1887.
Myosotis suffruticosa Torr. Ann. Lyc. N. Y. **2**: 225. 1828.
Oreocarya disticha Eastw. Bull. Torrey Club **30**: 238. 1903.
Artemisia, pinyon, and yellow pine belts. South Dakota to Texas, westward to Utah and Arizona.

14. Oreocarya abortiva Greene, Pittonia **3**: 114. 1896.
Pinyon, yellow pine, and aspen belts. Southern Nevada and southern California.

15. Oreocarya multicaulis (Torr.) Greene, Pittonia **3**: 114. 1896.
Eritrichum multicaule Torr. in Marcy, Expl. Red Riv. 62. 1854.
Yellow pine belt; Kaibab Plateau. Western Texas to Colorado and Arizona.

16. Oreocarya cinerea Greene, Pittonia **3**: 113. 1896.
Yellow pine belt; Kaibab Plateau. Colorado and New Mexico to Arizona.

17. Oreocarya pustulosa Rydb. Bull. Torrey Club **40**: 480. 1913.
Canyons of the artemisia and pinyon belts. Southern Utah.

18. Oreocarya nitida Greene, Pl. Baker. **3**: 21. 1901.
Artemisia, pinyon, and yellow pine belts. Western Colorado and Utah.

19. Oreocarya longiflora A. Nels. Erythea **7**: 67. 1899.
Artemisia, pinyon, and yellow pine belts. Western Colorado and Utah.

20. Oreocarya wetherillii Eastw. Bull. Torrey Club **30**: 242. 1903.
Krynitzkia glomerata acuta Jones, Zoe **2**: 250. 1891.
Oreocarya tenuis Eastw. Bull. Torrey Club **30**: 244. 1903.
Artemisia and pinyon belts. Utah.

21. Oreocarya shockleyi Eastw. Bull. Torrey Club **30**: 245. 1903.
Yellow pine belt. Nevada.

22. Oreocarya eulophus Rydb. Bull. Torrey Club **31**: 637. 1905.
Yellow pine belt. Colorado and Utah.

23. Oreocarya horridula Greene, Pl. Baker. **3**: 20. 1901.
Artemisia and pinyon belts. Western Colorado to central Utah.

24. Oreocarya flavoculata A. Nels. Erythea **7**: 66. 1899.
Oreocarya eastwoodae Nels. & Kennedy, Muhlenbergia **3**: 141. 1908.
Yellow pine belt. Wyoming and western Colorado to Nevada.

25. Oreocarya confertiflora Greene, Pittonia **3**: 112. 1896.
Krynitzkia leucophaea alata Jones, Proc. Calif. Acad. II. **5**: 710. 1895.
Pinyon and yellow pine belts. Western Colorado to southeastern California and Arizona.

14. CRYPTANTHE Lehm.

(Contributed by Ivan M. Johnston)

Margins of nutlets winged or acute.
Calyx evidently pedicellate; style surpassing even the wing of nutlet; suffrutescent perennials or long-lived annuals_____3. **C. racemosa.**
Calyx sessile or subsessile; style equaling or shorter than the body of the nutlets; herbaceous annuals.

Nutlets 4, at least 3 broadly winged; fruiting calyx conspicuously accrescent----------1. C. pterocarya.
Nutlets 1 or 2, narrowly winged; fruiting calyx not conspicuously accrescent----------2 C. utahensis.
Margins of nutlets rounded or but slightly angled.
Nutlets rough on one or both surfaces.
Nutlets of two sorts, one large and usually more or less persistent, the remaining three smaller and readily deciduous.
Calyx with the axial side strongly gibbose, pedicellate, closely appressed to stem----------4. C. dumetorum.
Calyx not gibbose, sessile or subsessile, ascending.
Leaves broadest near the tip; nutlets differing in color and markings, the odd one permanently affixed; gynobase much exceeded by nutlets----------5. C. crassisepala.
Leaves broadest at or below the middle; nutlets similar in color and markings, none permanently affixed; gynobase equaling the height of smaller nutlets----------6. C. angustifolia.
Nutlets all alike.
Nutlets tessellate-granulate as well as papillate.
Pubescence spreading; sepals usually short----------12. C. ambigua.
Pubescence strigose; sepals usually long----------13. C. simulans.
Nutlets muricate only.
Calyx with short silky hairs and no pungent bristles, spreading; nutlet 1----------2. C. utahensis.
Calyx always with some conspicuous pungent bristles; nutlets 1 to 4, usually 2 to 4.
Calyx recurved; ovules 2. Style two-thirds as long as the single nutlet----------7. C. recurvata.
Calyx not recurved; ovules 4.
Style about two-thirds as high as the 1 or 2 nutlets.
8. C. decipiens.

Style and nutlets subequal.
Calyx lobes but little longer than the nutlets, these ovate-lanceolate----------9. C. denticulata.
Calyx lobes over twice the length of the nutlets.
Calyx lobes not conspicuous long-villous; nutlets 4, long-acuminate; pubescence strigose----------10. C. nevadensis.
Calyx lobes conspicuously long-villous; nutlets commonly 2, ovate; pubescence hispid----------11. C. barbigera.
Nutlets smooth and shiny.
Nutlets obliquely compressed, the groove appearing excentric; lower leaves frequently opposite----------14. C. affinis.
Nutlets not obliquely compressed, grooved down the center; lower leaves never opposite.
Inflorescence conspicuously bracteolate, at least below. Ovules 2; stems usually reddish----------15. C. maritima.
Inflorescence not bracted. Stems never reddish.
Calyx evidently recurved, most hispid on axial side; ovules 2.
7. C. recurvata.
Calyx spreading to strict, most hispid on the obaxial side; ovules 4.
Calyx lacking hispid hairs, densely soft-hairy----------16. C. gracilis.
Calyx strigose with intermixed pungent bristles.

Stems strigose; nutlet 1, not compressed; calyx closely appressed to stem----------17. C. flaccida.
Stems spreading-hirsute; nutlets 1 to 4, more or less compressed; calyx usually spreading.
Stem simple below, branching widely above----18. C. fendleri.
Stem branched from the base.
Fruiting calyx 4.5 to 6 mm. long----------19. C. torreyana.
Fruiting calyx 4 mm. long----------20. C. watsoni.

1. Cryptanthe pterocarya (Torr.) Greene, Pittonia 1: 120. 1887.
Eritrichum pterocaryum Torr. U. S. & Mex. Bound. Bot. 142. 1859.
Cryptanthe cycloptera Greene, Bull. Calif. Acad. 1: 207. 1885.
Covillea and artemisia belts. Washington to California, eastward to Texas.

2. Cryptanthe utahensis (A. Gray) Greene, Pittonia 1: 120. 1887.
Krynitzkia utahensis A. Gray, Syn. Fl. ed. 2. 2^1: 427. 1886.
Eritrichum holopterum submolle A. Gray, Proc. Amer. Acad. 13: 374. 1878.
Cryptanthe submollis Coville, Contr. U. S. Nat. Herb. 4: 166. 1893.
Covillea and artemisia belts. Southern Utah and Arizona to southern California.

3. Cryptanthe racemosa (S. Wats.) Greene, Pittonia 1: 115. 1887.
Eritrichum racemosum S. Wats.; A. Gray, Proc. Amer. Acad. 17: 226. 1882.
Krynitzkia ramosissima A. Gray, Proc. Amer. Acad. 20: 277. 1884.
Cryptanthe racemosa lignosa I. M. Johnston, Univ. Calif. Publ. Bot. 7: 445. 1922.
Covillea belt. Nevada and California.

4. Cryptanthe dumetorum Greene, Pittonia 1: 112. 1887.
Krynitzkia dumetorum Greene; Gray, Proc. Amer. Acad. 20: 272. 1885.
Covillea and artemisia belts. Western Nevada and southern California.

5. Cryptanthe crassisepala (Torr. & Gray) Greene, Pittonia 1: 112. 1887.
Eritrichum crassisepalum Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. 2: 171. 1855.
Cryptanthe kelseyana Greene, Pittonia 2: 232. 1892.
Covillea and artemisia belts. Saskatchewan and Alberta, southward to Arizona and Texas.

6. Cryptanthe angustifolia (Torr.) Greene, Pittonia 1: 112. 1887.
Eritrichum angustifolium Torr. U. S. Rep. Expl. Miss. Pacif. 5: 363. 1856.
Covillea belt. Southern California and southern Utah, southward into Sonora.

7. Cryptanthe recurvata Coville, Contr. U. S. Nat. Herb. 4: 165. *pl. 16.* 1893.
Covillea belt. California and Nevada.

8. Cryptanthe decipiens (Jones) Heller, Muhlenbergia 8: 48. 1912.
Krynitzkia decipiens Jones, Contr. West. Bot. 13: 6. 1910.
Covillea belt. California, Arizona, and southern Nevada.

9. Cryptanthe denticulata Greene, Pittonia 1: 114. 1887.
Yellow pine belt. California and western Nevada.

10. Cryptanthe nevadensis Nels. & Kennedy, Proc. Biol. Soc. Washington 19: 157. 1906.
Cryptanthe muriculata montana A. Nels. Erythea 7: 69. 1899.
Krynitzkia barbigera inops K. Brandeg. Zoe 5: 228. 1906.
Cryptanthe arenicola Heller, Muhlenbergia 2: 242. 1906.

Cryptanthe leptophylla Rydb. Bull. Torrey Club 36: 678. 1909.
Cryptanthe scoparia A. Nels. Bot. Gaz. 54: 144. 1912.
Covillea and artemisia belts. Eastern Oregon and southern Utah to Nevada and southern California.

11. Cryptanthe barbigera (A. Gray) Greene, Pittonia 1: 114. 1887.
Eritrichum barbigerum A. Gray, Syn. Fl. 2¹: 194. 1878.
Krynitzkia mixta Jones, Contr. West. Bot. 13: 6. 1910.
Covillea and artemisia belts. Southern Utah to Lower California and Arizona.

12. Cryptanthe ambigua (A. Gray) Greene, Pittonia 1: 113. 1887.
Erithrichum muriculatum ambiguum A. Gray, Syn. Fl. 2¹: 194. 1878.
Cryptanthe multicaulis A. Nels. Bot. Gaz. 30: 194. 1900.
Artemisia, pinyon, and yellow pine belts. Washington to northern California, Nevada, and Montana.

13. Cryptanthe simulans Greene, Pittonia 5: 54. 1902.
Yellow pine belt. California and adjacent Nevada.

14. Cryptanthe affinis (A. Gray) Greene, Pittonia 1: 119. 1887.
Krynitzkia affinis A. Gray, Proc. Amer. Acad. 20: 270. 1885.
Cryptanthe geminata Greene, Pittonia 1: 119. 1887.
Cryptanthe confusa Rydb. Bull. Torrey Club 36: 679. 1909.
Artemisia, pinyon, and yellow pine belts. Montana to British Columbia, southward to Utah and California.

15. Cryptanthe maritima Greene, Pittonia 1: 117. 1887.
Krynitzkia maritima Greene, Bull. Calif. Acad. 1: 204. 1885.
Cryptanthe ramosissima Greene, Bull. Calif. Acad. 1: 203. Aug. 1885. Not *C. ramosissima* A. Gray, Jan. 1885.
Cryptanthe maritima pilosa I. M. Johnston, Univ. Calif. Publ. Bot. 7: 445. 1922.
Covillea belt. Southern California and Nevada to Lower California.

16. Cryptanthe gracilis Osterhout, Bull. Torrey Club 30: 236. 1903.
Cryptanthe hillmani Nels. & Kennedy, Proc. Biol. Soc. Washington 19: 157. 1906.
Artemisia, pinyon, and yellow pine belts. Idaho and western Colorado to northern Arizona and southeastern California.

17. Cryptanthe flaccida (Lehm.) Greene, Pittonia 1: 115. 1887.
Myosotis flaccida Lehm. Nov. Stirp. Pugill 2: 22. 1830.
Artemisia belt. Washington and Idaho to California.

18. Cryptanthe fendleri (A. Gray) Greene, Pittonia 1: 120. 1887.
Krynitzkia fendleri A. Gray, Proc. Amer. Acad. 20: 268. 1885.
Artemisia and pinyon belts. Saskatchewan to New Mexico and Arizona.

19. Cryptanthe torreyana (A. Gray) Greene, Pittonia 1: 118. 1887.
Krynitzkia torreyana A. Gray, Proc. Amer. Acad. 20: 271. 1885.
Krynitzkia torreyana calycosa A. Gray, Proc. Amer. Acad. 20: 271. 1885.
Artemisia, pinyon, and yellow pine belts. Alberta and British Columbia, southward to Utah and California.

20. Cryptanthe watsoni (A. Gray) Greene, Pittonia 1: 120. 1887.
Krynitzkia watsoni A. Gray, Proc. Amer. Acad. 20: 271. 1885.
Pinyon and yellow pine belts. Wyoming and Utah to Nevada and Idaho.

15. AMSINCKIA Lehm.

Calyx lobes lanceolate, 6 mm. long (10 mm. in fruit), hispid with brown hairs.
  Plant 30 to 80 cm. high; leaves lance-oblong to oblanceolate, sessile and clasping above; inflorescence leafy; corolla orange; nutlets tessellate-rugose ..... 1. A. tessellata.
Calyx lobes linear.
  Leaves lanceolate to lance-ovate, the upper sessile. Corolla light yellow, 8 mm. long; nutlets densely tuberculate ..... 2. A. menziesii.
  Leaves linear-oblong to linear-oblanceolate.
    Corolla rarely over 6 mm. long; nutlets rugose with tessellate ridges. 3. A. rugosa.
    Corolla about 10 mm. long; nutlets muricate ..... 4. A. echinata.

1. **Amsinckia tessellata** A. Gray, Proc. Amer. Acad. **10**: 54. 1874.
   Amsinckia tessellata macrosepala Jones, Contr. West. Bot. **12**: 58. 1908.
   Covillea, artemisia, pinyon, and yellow pine belts. Washington to California, eastward to Utah and Arizona.

2. **Amsinckia menziesii** (Lehm.) Nels. & Macbr. Bot. Gaz. **61**: 36. 1916.
   Echium menziesii Lehm. Nov. Stirp. Pugill. **2**: 29. 1830.
   Artemisia and pinyon belts. British Columbia to California, eastward to Arizona.

3. **Amsinckia rugosa** Rydb. Fl. Rocky Mount. 729, 1066. 1917.
   Artemisia and pinyon belts. Idaho and Washington to Nevada and Utah.

4. **Amsinckia echinata** A. Gray, Proc. Amer. Acad. **10**: 54. 1874.
   Covillea belt; Needles, California. Southern California and Nevada (?).

16. ASPERUGO L.

1. **Asperugo procumbens** L. Sp. Pl. 138. 1753.
   Waste places; introduced from Europe.

17. ANCHUSA L. Bugloss

1. **Anchusa officinalis** L. Sp. Pl. 133. 1753.
   Waste places; introduced from Europe. Oregon.

18. BORAGO L. Borage

1. **Borago officinalis** L. Sp. Pl. 137. 1753.
   Waste places; southern California. Introduced from Europe.

19. MYOSOTIS L. Forget-me-not

Plant annual, 30 to 50 cm. high; leaves spatulate to oblanceolate below, those of the stem linear-lanceolate ..... 1. M. macrosperma.
Plant perennial, 10 to 30 cm. high; leaves oblanceolate, those of the stem lanceolate or oblong ..... 2. M. alpestris.

1. **Myosotis macrosperma** Engelm. Amer. Journ. Sci. **46**: 98. 1844.
   Moist places, artemisia, pinyon, and yellow pine belts. Maryland to Florida, westward to Texas, California, and British Columbia.

2. **Myosotis alpestris** Schult.; Lehm. Pl. Asper. 86. 1818.
   Spruce and alpine belts; Wyoming. Alberta to Alaska, southward to Colorado; also in Europe and Asia.

20. MERTENSIA Roth. Bluebells

Leaves with distinct venation, the middle cauline ones 6 to 12 cm. long.
Calyx lobes oblong, obtuse, ciliate. Corolla 12 to 15 mm. long; leaves oval to elliptic-ovate, lance-ovate, or oblong
Calyx lobes rarely over 2 mm. long——1. M. ciliata.
Calyx lobes 2.5 to 3 mm. long——2. M. stomatechoides.
Calyx lobes acute or acuminate.
Pedicels mostly glabrous or lepidote.
Calyx lobes in anthesis shorter than the tube, ciliate. Corolla 12 to 15 mm. long; leaves oblong or lanceolate, pustulate above.
6. M. arizonica.
Calyx lobes much exceeding the tube. Leaves (except the lowermost) sessile.
Leaves not more than twice longer than broad, ovate-elliptic to suborbicular. Corolla tube slender——9. M. praecox.
Leaves at least thrice longer than broad. Lower leaves oblanceolate, 10 cm. long or less.
Corolla about 15 mm. long, the limb 7 to 8 mm. wide; calyx lobes twice longer than the tube; stem leaves lanceolate or ovate.
7. M. leonardi.
Corolla about 12 mm. long, the limb 5 to 6 mm. wide; calyx cleft nearly to the base; stem leaves elliptic-lanceolate or ovate.
8. M. sampsoni.
Pedicels mostly hairy.
Corolla about 15 mm. long, blue or white, the limb equaling the tube.
Leaves oval or elliptic-lanceolate to lanceolate above, strigose on the upper face——5. M. pratensis.
Corolla about 10 mm. long.
Leaves glabrous on the lower face (see below).
4a. M. toyabensis subnuda.
Leaves pubescent on both faces.
Calyx lobes lance-linear, acuminate; leaves elliptic to ovate or lanceolate, acuminate——3. M. paniculata.
Calyx lobes lance-oblong, acutish; leaves lance-oblong to lanceolate or ovate-lanceolate above, acuminate——4. M. toyabensis.
Leaves (except sometimes the lower) without distinct venation, the middle cauline rarely over 6 cm. long. Plants rarely over 40 cm. high.
Filaments filiform or the anthers subsessile. Calyx strigose; corolla tube short, the limb broad; leaves oblong to oblanceolate, mostly rounded at apex——20. M. brevistyla.
Filaments usually broader than the anthers.
Leaves glabrous on both faces, rarely pustulate above.
Corolla pubescent within, 10 mm. long. Leaves oblong or lanceolate.
14. M. lanceolata.
Corolla glabrous within, 10 to 18 mm. long.
Inflorescence open, the fruiting pedicels about 10 mm. long; leaves spatulate or oblanceolate and obtuse or ovate-lanceolate and acutish——17. M. nevadensis.
Inflorescence congested; leaves oblong or spatulate to elliptic-lanceolate or ovate above.

Filaments equaling or longer than the anthers; corolla 15 to 18 mm. long ---------- **18. M. foliosa.**
Filaments much shorter than the anthers; corolla about 10 mm. long. **19. M. nelsoni.**

Leaves pubescent or pustulate, at least on the upper face.
Leaves pubescent on both faces.
Stem leaves oblong-lanceolate or ovate, strigose; calyx pilose; corolla 7 to 10 mm. long ---------- **11. M. bakeri.**
Stem leaves broadly linear to narrowly oblanceolate, pilose; calyx ciliate, often hirsute; corolla 10 to 15 mm. long -- **12. M. amoena.**
Leaves glabrous on the lower face.
Calyx long-pubescent. Corolla 8 to 10 mm. long, the tube glabrous within; leaves spatulate to oblong or lanceolate; root fusiform. **13. M. fusiformis.**
Calyx merely ciliate.
Corolla tube pubescent within, 10 to 12 mm. long. Leaves obovate to broadly lance-ovate or lance-oblong above ---- **10. M. ovata.**
Corolla tube glabrous within, the tube 10 mm. long or more.
Basal leaves few or wanting, oblanceolate or spatulate, the cauline linear to linear-oblong ---------- **15. M. oblongifolia.**
Basal leaves numerous, oblanceolate or spatulate, the cauline oblong or lanceolate ---------- **16. M. nutans subcalva.**

1. Mertensia ciliata (James) Don, Hist. Dichl. Pl. **4**: 372. 1838.
Pulmonaria ciliata James; Torr. Ann. Lyc. N. Y. **2**: 224. 1828.
Yellow pine, aspen, and spruce belts. Wyoming and Colorado to Utah and Nevada.

2. Mertensia stomatechoides Kellogg, Proc. Calif. Acad. **2**: 148. 1862.
Aspen and spruce belts; Sierra Nevada. Nevada and California.

3. Mertensia paniculata (Ait.) Don, Hist. Dichl. Pl. **4**: 318. 1838.
Pulmonaria paniculata Ait. Hort. Kew. **1**: 181. 1789.
Mertensia membranacea Rydb. Bull. Torrey Club **28**: 33. 1901.
Yellow pine, aspen, and spruce belts. Hudson Bay to Alaska, southward to Ontario, Utah, and Nevada.

4. Mertensia toyabensis Machr. Contr. Gray Herb. n. ser. **48**: 7. 1916.
Artemisia, pinyon, and yellow pine belts. Nevada.

4a. Mertensia toyabensis subnuda Macbr. Contr. Gray Herb. n. ser. **48**: 7. 1916.
Yellow pine and aspen belts. Utah.

5. Mertensia pratensis Heller, Bull. Torrey Club **26**: 550. 1899.
Yellow pine belt and upward to the subalpine belt. Western Colorado and Utah to New Mexico and Arizona.

6. Mertensia arizonica Greene, Pittonia **3**: 197. 1897.
Yellow pine, aspen, and spruce belts. Utah and Arizona.

7. Mertensia leonardi Rydb. Bull. Torrey Club **36**: 680. 1909.
Yellow pine, aspen, and spruce belts. Utah.

8. Mertensia sampsoni Tidestrom, Proc. Biol. Soc. Washington **26**: 122. 1913.
Spruce belt. Utah. Perhaps only a form of the preceding species.

9. Mertensia praecox Smiley; Macbr. Contr. Gray Herb. n. ser. **48**: 10. 1916.
Canyons of the yellow pine and aspen belts (?). Utah.

10. Mertensia ovata Rydb. Bull. Torrey Club **28**: 32. 1901.
Mertensia parryi Rydb. Bull. Torrey Club **31**: 639. 1905.
Spruce and subalpine belts. Colorado and Utah.

11. Mertensia bakeri Greene, Pittonia **4**: 90. 1899.
Mertensia paniculata nivalis S. Wats. in King, Geol. Expl. 40th Par. **5**: 239. 1871.
Spruce and alpine belts. Colorado and Utah.

12. Mertensia amoena A. Nels. Bot. Gaz. **30**: 195. 1900.
Yellow pine, aspen, and spruce belts. Montana to Colorado and Idaho.

13. Mertensia fusiformis Greene, Pittonia **4**: 89. 1899.
Aspen, spruce, and alpine belts. Colorado and Utah.

14. Mertensia lanceolata (Pursh) DC. Prodr. **10**: 88. 1846.
Pulmonaria lanceolata Pursh, Fl. Amer. Sept. 729. 1814.
Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to British Columbia, southward to Colorado and Nevada.

15. Mertensia oblongifolia (Nutt.) Don, Hist. Dichl. Pl. **4**: 372. 1838.
Pulmonaria oblongifolia Nutt. Journ. Acad. Phila. **7**: 43. 1834.
Yellow pine belt; northern Nevada. Montana to British Columbia and Nevada.

16. Mertensia nutans subcalva Piper, Contr. U. S. Nat. Herb. **11**: 479. 1906.
Yellow pine belt. Montana to Washington, Oregon, and Nevada.

17. Mertensia nevadensis A. Nels. Proc. Biol. Soc. Washington **17**: 96. 1904.
Yellow pine belt. Nevada.

18. Mertensia foliosa A. Nels. Bull. Torrey Club **36**: 243, 1899.
Yellow pine belt. Montana to Utah, westward to Oregon.

19. Mertensia nelsoni Macbr. Contr. Gray Herb. n. ser. **48**: 19. 1916.
Yellow pine belt. Nevada.

20. Mertensia brevistyla S. Wats. in King, Geol. Expl. 40th Par. **5**: 239. 1871.
Pinyon, yellow pine, and aspen belts. Utah and Wyoming.

21. LITHOSPERMUM L. GROMWELL

Corolla tube equaling or slightly exceeding the calyx.
Plant annual, minutely canescent, 20 to 60 cm. high, branching from the base; corolla whitish, 6 mm. long; nutlets dull brown, coarsely pitted. **1. L. arvense.**
Plant perennial, softly hirsute-pubescent; stems numerous from a stout root; leaves 5 to 10 cm. long, linear-lanceolate, tapering from near the base; corolla greenish yellow, about 12 mm. long; nutlets broadly ovate, acute, smooth, 4 to 5 mm. long ---------- **2. L. ruderale.**
Corolla tube much exceeding the calyx, yellow.
Corolla (of early flowers, the late flowers smaller) 25 mm. long or more, the lobes 5 mm. long, rounded, crenulate-erose; nutlets impressed-punctate, carinate ventrally. Leaves linear or linear-oblanceolate, acute or obtuse, 4 cm. long or less; plants 30 cm. high or less, strigose. **3. L. linearifolium.**

Corolla 2 cm. long or less, the limb 6 to 8 mm. wide; nutlets smooth, white, shining.

Corolla 10 mm. long or less; leaves linear, acute or obtuse, 3 cm. long or less; plants silvery-strigose, with slender stems, 20 to 30 cm. high.

4. L. breviflorum.

Corolla 12 mm. long or more; leaves linear-lanceolate, 6 cm. long or less, tapering from near the base; plants strigose-hispid, 30 to 60 cm. high, with numerous virgate stems from a stout root.

5. L. multiflorum.

1. Lithospermum arvense L. Sp. Fl. 132. 1753.

Fields and waste places; introduced from Europe.

2. Lithospermum ruderale Dougl.; Lehm. Nov. Stirp. Pugill **2**: 28. 1830.

Lithospermum lanceolatum Rydb. Mem. N. Y. Bot. Gard. **1**: 333. 1900.

Foothills and lower canyons of the artemisia, pinyon, and yellow pine belts. Alberta to British Columbia, southward to Colorado, Utah, and California.

3. Lithospermum linearifolium Goldie, Edinburgh Phil. Journ. **1822**: 322. 1822.

Plains, dry canyons, and mountain sides of the artemisia, pinyon, and yellow pine belts. Manitoba to British Columbia, southward to Texas and Arizona.

4. Lithospermum breviflorum Engelm. & Gray, Bost. Journ. Nat. Hist. **5**: 252. 1845.

Plains and rocky canyons of the artemisia, pinyon, and yellow pine belts. Arkansas to Texas, westward to Colorado and southeastern Utah, and southward.

5. Lithospermum multiflorum Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 238. 1871.

Yellow pine, aspen, and spruce belts. Wyoming to Mexico.

22. ONOSMODIUM Michx.

1. Onosmodium occidentale Mackenz. Bull. Torrey Club **32**: 502. 1905.

Plains and mountain sides of the artemisia, pinyon, and yellow pine belts; Wyoming. Manitoba to Alberta, southward to Illinois, Texas, New Mexico, and Utah.

23. ECHIUM L.

1. Echium vulgare L. Sp. Pl. 139. 1753.

Waste places; New Mexico. Introduced from Europe and established in the eastern states. Specimens reported from southern California prove to be *Borago officinalis*.

111. VERBENACEAE. Verbena Family

Herbs, shrubs, or trees; leaves mostly opposite; flowers in axillary or terminal spikes, racemes, or panicles, 4 or 5-merous; calyx inferior, lobed or cleft; corolla gamopetalous, regular or iregular, the tube cylindric, the limb lobed; staments 4, didymous, inserted on the tube of the corolla; style 1; ovary 2 to 4-celled, 1 ovule in each cavity; fruit 2 to 4-celled, dry or drupaceous, separating into dry nutlets.

Plant an aromatic shrub, divaricately branched, 1 meter high or more. Leaves 8 to 16 mm. long, ovate-orbicular, crenate, rugose, short-pointed, hispidulous; flowers small, white, in terminal spikes; fruit of 2 nutlets.

2. LIPPIA.

Plants annual or perennial herbs.
Flowers in terminal, single or panicled spikes; calyx 5-toothed; corolla tubular, salverform; prostrate or erect plants_____1. **VERBENA.**
Flowers in pedunculate axillary heads or short spikes; calyx 2 to 4-toothed or 2-lipped; corolla 2-lipped, the upper lip notched, the lower 3-toothed; prostrate or creeping plants_____3. **PHYLA.**

1. VERBENA L. VERBENA

Leaves serrate or at the most lobed at the base. Bracts mostly shorter than the calyx; spike dense; plants erect, 30 to 200 cm. high.
Plant sparingly hispid. Leaves lanceolate to ovate-lanceolate, sharply and doubly serrate; corolla purplish blue, 3 to 6 mm. broad___1. **V. hastata.**
Plants hispid-villous or pilose throughout. Calyx cylindric-oblong, the teeth lance-subulate.
Leaves oblong-lanceolate, incised-serrate, soft-pubescent; corolla blue, the tube not exserted_____2. **V. macdougalii.**
Leaves ovate, with broadly cuneate base, incised crenate-serrate, canescently pilose; corolla purplish, the tube scarcely exserted. **5a. V. gooddingii nepetifolia.**

Leaves once or twice pinnatifid.
Bracts subtending the flowers exserted. Nutlets reticulate on the dorsal face.
Plant prostrate, branching from the base; leaves pinnately lobed or incised; flowers in a dense spike; corolla small, blue. **3. V. bracteosa.**
Plant mostly erect, hirsute; leaves obovate, mostly bipinnatifid; flowers in a lax spike; corolla lilac, 4 to 5 mm. broad_____4. **V. remota.**
Bracts subtending the flowers not exserted. Erect perennial, canescently pilose; leaves ovate, with broad cuneate base, 3-lobed or 3-parted, the lobes incised-crenate; corolla purplish, the tube scarcely exserted. **5. V. gooddingii.**

1. Verbena hastata L. Sp. Pl. 20. 1753.
Waste places; Provo. Nova Scotia to Florida, westward to British Columbia and California.

2. Verbena macdougalii Heller, Bull. Torrey Club **26**: 588. 1899.
Canyons and grassy flats of the artemisia, pinyon, and yellow pine belts. Colorado and Utah to New Mexico and Arizona.

3. Verbena bracteosa Michx. Fl. Bor. Amer. **2**: 13. 1803.
Plains and hillsides of the Covillea and artemisia belts. Manitoba to Florida, westward to British Columbia and California.

4. Verbena remota Benth. Pl. Hartw. 21. 1839.
Plains and hillsides of the artemisia belt; Monticello, Utah. Southern Utah to southern California and Mexico.

5. Verbena gooddingii Briq. Ann. Cons. Jard. Genève **10**: 103. 1907.
Canyons and hillsides of the Covillea belt. Southern Utah and Nevada, western Arizona, and southeastern California.

5a. Verbena gooddingii nepetifolia Tidestrom. Proc. Biol. Soc. Washington **38**: 15. 1925.
Canyons and hillsides of the Covillea belt; El Dorado Canyon, southern Nevada.

2. LIPPIA L. Lippia

1. **Lippia wrightii** A. Gray, Amer. Journ. Sci. II. **16**: 98. 1853.

Mesas, rocky canyons, and hillsides of the Covillea and lower artemisia belts. Western Texas to southern Nevada, southward to Mexico.

3. PHYLA Lour.

Leaves cuneate or linear-oblanceolate, toothed near the apex; peduncles equaling or slightly exceeding the leaves ..... 1. **P. cuneifolia.**

Leaves lanceolate to ovate, sharply serrate; peduncles much exceeding the leaves ..... 2. **P. lanceolata.**

1. **Phyla cuneifolia** (Torr.) Greene, Pittonia **4**: 47. 1899.

Zapania cuneifolia Torr. Ann. Lyc. N. Y. **2**: 234. 1828.

Wet places, along saline ponds, hillsides, and canyons of the Covillea and artemisia belts; Colorado River. South Dakota and Wyoming, southward to Texas and Arizona.

2. **Phyla lanceolata** (Michx.) Greene, Pittonia **4**: 47. 1899.

Lippia lanceolata Michx. Fl. Bor. Amer. **2**: 15. 1803.

Along ditches; St. Thomas. Possibly introduced from the Eastern States. Ontario to Florida, westward to Mexico.

112. SOLANACEAE. Potato Family

Annual or perennial herbs or shrubs; leaves alternate, estipulate; flowers perfect, regular, mostly 5-merous; calyx gamosepalous; corolla gamopetalous; stamens inserted on the corolla tube and alternating with the lobes; style 1; stigma entire; ovary superior, 2-celled (rarely 3 to 5-celled); fruit a berry or capsule.

Shrubs. Fruit a berry ..... 1. **LYCIUM.**

Herbs.

Fruit a capsule.

Corolla campanulate, yellowish with purple veins, 2 cm. long. Plant 30 to 100 cm. high, viscid-villous; leaves oblong to ovate, toothed or lobed. **3. HYOSCYAMUS.**

Corolla funnelform to tubular.

Corolla 10 to 20 cm. long ..... 8. **DATURA.**

Corolla 2 to 3 cm. long ..... 9. **NICOTIANA.**

Fruit a berry.

Calyx campanulate, becoming inflated in fruit, 5-angled, 10-ribbed. Corolla funnelform or campanulate, yellow to white ..... 5. **PHYSALIS.**

Calyx not inflated in fruit.

Corolla blue or purplish, tubular, with a short scarcely spreading limb. Low erect viscid-pubescent annual; leaves ovate to lanceolate, petioled, entire or undulate; flowers in axillary umbels. **2. ORYCTES.**

Corolla rotate.

Calyx investing the fruit ..... 4. **CHAMAESARACHA.**

Calyx persistent but not investing the fruit.

Anthers opening by apical pores or chinks ..... 6. **SOLANUM.**

Anthers longitudinally dehiscent. Annual, 30 to 100 cm. high, diffusely branched, viscid-pubescent; leaves once or twice pinnately divided, the leaflets ovate to ovate-lanceolate, dentate or lobed. **7. LYCOPERSICON.**

1. LYCIUM L.

Stems slender, climbing. Leaves lanceolate to oblong, 1 to 4 cm. long; corolla purplish, short-funnelform, 8 to 12 mm. wide_____5. L. halimifolium.
Stems stout, erect.
Corolla about 20 mm. long, greenish, tinged with purple. Pedicels equaling or exceeding the deeply cleft calyx; berries red; leaves 2 to 5 cm. long, spatulate to oblanceolate; glabrous shrub 0.5 to 1 meter high or more_____1. L. pallidum.
Corolla 8 to 12 mm. long, tubular-funnelform.
Leaves 4 to 12 mm. long, linear-spatulate or broader, obtuse. Pedicels 2 to 6 mm. long, about equaling the toothed calyx; berries red; glabrous shrub, 1 meter high or less, diffusely branched_____3. L. andersonii.
Leaves 10 to 25 mm. long.
Leaves minutely viscid-pubescent, commonly oblanceolate, 20 mm. long or less; calyx campanulate, toothed, hirsute or pubescent, equaling the pedicel; shrub 0.5 to 1 meter high, with stout branches. 2. L. cooperi.
Leaves glabrous, 25 mm. long or less, oblanceolate; calyx broadly campanulate, toothed, glabrous, exceeded by the slender pedicel; shrub 1 to 2.5 m. high_____4. L. torreyi.

1. **Lycium pallidum** Miers, Ann. Mag. Nat. Hist. II. 14: 131. 1854.
Plains, hillsides, and canyons of the Covillea, artemisia, and pinyon belts. Colorado and Utah, southward to Mexico.

2. **Lycium cooperi** A. Gray, Proc. Amer. Acad. 7: 388. 1868.
Desert areas and hillsides of the Covillea and artemisia belts. Nevada to Arizona and southern California.

3. **Lycium andersonii** A. Gray, Proc. Amer. Acad. 7: 388. 1868.
Desert areas and hillsides of the Covillea and artemisia belt. Utah and northern Arizona to Nevada.

4. **Lycium torreyi** A. Gray, Proc. Amer. Acad. 6: 47. 1862.
Desert areas and dry hillsides of the Covillea belt. Western Texas to southern Utah, Nevada, and California.

5. **Lycium halimifolium** Mill. Gard. Dict. ed. 8. *Lycium* No. 6. 1768.
Lycium vulgare Dunal in DC. Prodr. 13[1]: 509. 1852.
In cultivation, and escaped about settlements; Utah. Native of China.

2. ORYCTES S. Wats.

1. **Oryctes nevadensis** S. Wats. in King, Geol. Expl. 40th Par. 5: 274. *pl. 28, f. 5–10.* 1871.
Valleys and plains of the artemisia belt. Nevada and Idaho.

3. HYOSCYAMUS L. Henbane

1. **Hyoscyamus niger** L. Sp. Pl. 179. 1753.
Waste places; introduced from Europe. Nova Scotia to New York, westward to Montana and Nevada.

4. CHAMAESARACHA A. Gray

Leaves lanceolate to linear, cuneate, 3 cm. long or more, entire to laciniate-pinnatifid; peduncles elongate; corolla yellowish, 1 cm. broad or more; berry 5 to 8 mm. in diameter; plants 10 to 30 cm. high, diffusely branched, more or less hirsute_____1. C. coronopus.

Leaves oblong to ovate, acute, entire or nearly so, the blades 2 cm. long or more, decurrent; peduncles 2 cm. long or more; corolla white or bluish, 14 to 18 mm. in diameter; berry 10 mm. in diameter, black (?); plants 10 to 15 cm. high, branching from the base, appressed-pubescent.
2. C. nana.

1. Chamaesaracha coronopus (Dunal) A. Gray in Brewer & Wats. Bot. Calif. 1: 540. 1876.

Solanum coronopus Dunal in DC. Prodr. 13¹: 64. 1852.

Plains and dry hills of the Covillea and artemisia belts. Kansas to southern Utah and California and southward.

2. Chamaesaracha nana A. Gray, Syn. Fl. 2¹: 233. 1878.

Sagebrush plains and mountain sides, upward to 2,700 meters. Oregon to Nevada and California.

5. PHYSALIS L. GROUNDCHERRY

Plant annual, pubescent, 30 to 60 cm. high, with angled stems. Leaves orbicular to ovate, acute, sinuate-dentate, 3 to 8 cm. long; corolla yellowish, with purple center; fruiting calyx sharp-angled, about 2 cm. long.
1. P. neomexicana.

Plants perennial.

Plants glabrous or nearly so, 50 to 100 cm. high. Leaves lanceolate to oblong or linear, 5 to 10 cm. long; corolla 1 to 2 cm. broad, yellow, with brown center; fruiting calyx ovoid, 3 cm. long----**2. P. longifolia.**

Plants more or less pubescent or glandular.

Pubescence more or less glandular, not stellate (often with branched hairs); plants 30 to 100 cm. high. Corolla 15 to 20 mm. broad.

Leaf blades 5 to 10 cm. long, broadly ovate-cordate, acute, sinuate-toothed; fruiting calyx ovoid, 2 cm. long------**3. P. heterophylla.**

Leaf blades 3 to 5 cm. long, broadly ovate-cordate to reniform, coarsely angular-toothed; fruiting calyx ovoid, 2 to 3 cm. long.
4. P. hederaefolia.

Pubescence more or less stellate, often finely glandular; plants 20 to 60 cm. high.

Pubescence dense; leaves deltoid to ovate-lanceolate, 1 to 4 cm. long, more or less deeply sinuate-toothed; corolla yellow, with brown center; fruiting calyx round-ovoid, 2 to 3 cm. long----**5. P. fendleri.**

Pubescence scattered (sometimes wanting); leaves ovate, deltoid or cordate, 2 cm. long or more; corolla yellow (rarely with purple center); fruiting calyx ovoid, 2 to 3 cm. long.
6. P. crassifolia cardiophylla.

1. Physalis neomexicana Rydb. Mem. Torrey Club 4: 325. 1896.

Plains, in cultivated and waste ground. Colorado and New Mexico, westward to Lower California (?). Possibly not within our limits.

2. Physalis longifolia Nutt. Trans. Amer. Phil. Soc. n. ser. 5: 193. 1837.

Plains and hillsides of the Covillea, artemisia, and pinyon belts. Montana to Arkansas, Arizona, and Mexico.

3. Physalis heterophylla Nees, Linnaea 6: 463. 1831.

Cultivated ground and mountain sides, upward to 2,400 meters. New Brunswick to Saskatchewan, southward to Florida, Texas, and Utah.

4. Physalis hederaefolia A. Gray, Proc. Amer. Acad. 10: 65. 1874.

Plains and foothills of the Covillea and artemisia belts. Colorado to Texas, southern Utah, California, and Mexico.

5. Physalis fendleri A. Gray, Proc. Amer. Acad. **10**: 66. 1874.

Plains and rocky hillsides of the pinyon and yellow pine belts. Colorado and New Mexico to Arizona and Mexico.

6. Physalis crassifolia cardiophylla (Torr.) A. Gray, Syn. Fl. **2**[1]: 235. 1878.

Physalis cardiophylla Torr. U. S. & Mex. Bound. Bot. 153. 1859.

Plains and hillsides of the Covillea and artemisia belts. Utah to California, southward to Mexico and Lower California.

6. SOLANUM L. NIGHTSHADE

Leaves pinnate, 5 cm. long or more. Leaflets lanceolate, subentire; inflorescence cymose; corolla white, with lanceolate (7 to 8 mm. long) lobes; stems 10 to 30 cm. high, glabrous or sparingly pubescent—**5. S. jamesii.**

Leaves entire to deeply pinnatifid.

Leaves deeply pinnatifid, 3 to 9 cm. long, oblong to ovate; lobes oblong, acute, mostly entire. Corolla white, 8 to 10 mm. broad; berry black; annual, branched from the base, with spreading stems 20 to 90 cm. long—**1. S. triflorum.**

Leaves entire to deeply 3-lobed.

Stems and leaves more or less beset with prickles. Perennials, 30 to 100 cm. high; corolla 2 cm. broad or more.

Leaves oblong to linear, undulate to entire, silvery white, finely stellate-pubescent; corolla violet or white—**7. S. elaeagnifolium.**

Leaves ovate, sinuate-toothed or angular-lobed, coarsely stellate-pubescent; corolla blue—**8. S. carolinense.**

Stems and leaves not prickly.

Plants climbing. Stems 0.5 to 1.5 meters long; leaves ovate, 3 to 10 cm. long, simple or with 2 small basal lateral lobes; corolla blue or white, 15 mm. broad; berries ellipsoid, red—**6. S. dulcamara.**

Plants not climbing.

Plants viscid-villous, 30 to 100 cm. high. Leaves ovate to rhombic-ovate, sinuate-dentate; corolla white to greenish or yellowish, about 10 mm. broad; berry yellowish or greenish—**4. S. villosum.**

Plants glabrous or glandular-pubescent.

Flowers 2 to 2.5 cm. broad, violet or blue, with yellow throat; berry purple. Perennial, 20 to 40 cm. high or more, glandular-pubescent; leaves ovate to ovate-oblong, entire or repand—**9. S. xanti.**

Flowers 10 to 15 mm. broad, mostly white; berries black, 5 to 8 mm. in diameter.

Sepals obtuse; plants 1 meter high or less, glabrous, annual; leaves ovate or oblong-ovate, undulate or sinuately lobed. **2. S. nigrum.**

Sepals abruptly acute; annual or perennial, often 1 meter high, or more, glabrous or strigose; leaves ovate, or somewhat hastate, sinuate-dentate, strigose beneath—**3. S. douglasii.**

1. Solanum triflorum Nutt. Gen. Pl. **1**: 128. 1818.

Plains and canyons of the artemisia and pinyon belts. Ontario to British Columbia, southward to Kansas, New Mexico, and Nevada.

2. Solanum nigrum L. Sp. Pl. 186. 1753. BLACK NIGHTSHADE.

Solanum interius Rydb. Bull. Torrey Club **31**: 641. 1904.

About settlements; introduced from Europe. Temperate and tropical North America.

3. Solanum douglasii Dunal in DC. Prodr. **13**[1]: 48. 1852.

In valleys; southern Nevada. Oregon and California to New Mexico and southward.

4. Solanum villosum Mill. Gard. Dict. ed. 8. Solanum No. 2. 1768.

Bosleria nevadensis A. Nels. Proc. Biol. Soc. Washington **18**: 175. 1905.

About settlements, in canyons, and on hillsides, upward to the yellow pine belt; introduced from Europe. British Columbia to Lower California and New Mexico and southward.

5. Solanum jamesii Torr. Ann. Lyc. N. Y. **2**: 227. 1828.

Plains and sandy canyons of the artemisia, pinyon, and yellow pine belts. Colorado and Utah, southward to Texas and Mexico.

6. Solanum dulcamara L. Sp. Pl. 185. 1753. BITTERNIGHTSHADE.

About settlements; Idaho. Introduced from Europe. New Brunswick to Florida, westward to Kansas and Idaho.

7. Solanum elaeagnifolium Cav. Icon. Pl. **3**: 22. *pl. 243*. 1794.

Solanum flavidum Torr. Ann. Lyc. N. Y. **2**: 227. 1828.

Plains and dry hillsides of the Covillea and artemisia belts. Missouri to Texas, westward to California and Mexico.

8. Solanum carolinense L. Sp. Pl. 187. 1753. BULLNETTLE.

Cultivated fields; Idaho. Massachusetts to Florida, westward to Texas and Idaho.

9. Solanum xanti A. Gray, Proc. Amer. Acad. **11**: 90. 1876.

Along creeks, artemisia, yellow pine, and aspen belts. California and western Nevada.

7. LYCOPERSICON Mill. TOMATO

1. Lycopersicon esculentum Mill. Gard. Dict. ed. 8. *Lycopersicum* No. 1768.

Solanum lycopersicum L. Sp. Pl. 185. 1753.

Extensively cultivated; escaped about settlements. Native of tropical America.

8. DATURA L. DATURA

Corolla 15 to 20 cm. long, white, tinged with violet. Capsule 4 to 5 cm. long, short-prickly, reflexed in fruit; stems 30 to 100 cm. high, grayish-puberulent; leaves obliquely ovate, entire or repand; seeds pale brown. **1. D. meteloides.**

Corolla 6 to 10 cm. long. Seeds dark brown to black.

Plant glabrous; flowers white or lavender; capsule erect, 4-valved, normally armed with subequal spines; leaves ovate or oblong, sinuate or laciniate-toothed ---- **2. D. stramonium.**

Plant more or less cinereous; flowers white, with purple or violet throat; capsule nodding, dehiscing irregularly, armed with short, slender prickles; leaves ovate, repand or sinuate-dentate ---- **3. D. discolor.**

1. Datura meteloides DC.; Dunal in DC. Prodr. **13**[1]: 544. 1852. SACRED DATURA.

Along streams and in moist places of the Covillea and artemisia belts. Colorado to western Texas, westward to California and Mexico.

2. Datura stramonium L. Sp. Pl. 179. 1753. JIMSONWEED.

Datura tatula L. Sp. Pl. ed. 2. 256. 1762.

Waste places and cultivated ground; introduced from Asia. Nova Scotia to Minnesota, southward to West Indies and South America.

3. Datura discolor Bernh. in Neu. Journ. Pharm. Trommsd. **26**: 149. 1833.
Datura thomasii Torr. U. S. Rep. Expl. Miss. Pacif. **5**: 362. 1855.

Valleys of the Covillea and artemisia belts. West Indies and Mexico to Colorado and southern California.

9. NICOTIANA L. Tobacco

Leaves not clasping (except upper ones in no. 2); plants 30 to 60 cm. high, viscid-pubescent; inflorescence paniculate or racemose; corolla white or greenish.
  Leaves distinctly petioled, ovate or oblong to linear-lanceolate, acuminate; calyx teeth triangular, nearly equal——1. N. attenuata.
  Leaves sessile or the lower short-petioled, oblong-lanceolate, 10 to 15 cm. long; calyx teeth unequal, linear-subulate——2. N. bigelovii.
Leaves with more or less clasping base, the lowest with dilated petioles, ovate-oblong to oblong-lanceolate; plants 30 to 90 cm. high, viscid-pubescent or tomentose; flowers greenish or yellowish white.
  Corolla about 2 cm. long, constricted at the orifice, the limb 8 mm. in diameter——3. N. trigonophylla.
  Corolla about 2.5 cm. long, not constricted at the orifice, the limb 12 to 14 mm. in diameter——4. N. palmeri.

1. Nicotiana attenuata Torr.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 276. *pl. 27, f. 1.* 1871.

Valleys and foothills of the artemisia, pinyon, and yellow pine belts. Texas to Utah and California.

2. Nicotiana bigelovii (Torr.) S. Wats. in King. Geol. Expl. 40th Par. **5**: 276. *pl. 27, f. 3–4.* 1871.
Nicotiana plumbaginifolia bigelovii Torr. U. S. Rep. Expl. Miss. Pac. **4**: 127. 1857.

Valleys and foothills of the artemisia and pinyon belts. California and Nevada to Arizona.

3. Nicotiana trigonophylla Dunal in DC. Prodr. **13**[1]: 562. 1852.

Rocky and sandy places of the Covillea and artemisia belts. New Mexico and western Texas, westward to southern Nevada and California.

4. Nicotiana palmeri A. Gray, Syn. Fl. N. Amer. **2**[1]: 242. 1878.

Desert areas and dry canyons of the Covillea belt. Arizona and southern Nevada.

113. MENTHACEAE. Mint Family

Aromatic herbs or shrubs with quadrangular stems; leaves opposite, simple, estipulate, glandular-punctate; inflorescence in axillary clusters, terminal spikelike panicles, or heads; calyx gamosepalous; corolla gamopetalous, mostly irregular and bilabiate; stamens 2 or 4, borne on the corolla tube; style usually 2-lobed; ovary 4-lobed or parted; fruit of 4 seedlike nutlets.

Corolla regular or nearly so. Calyx campanulate, 4 or 5-toothed, the teeth nearly equal.
Ovary of 4 united carpels; style not basal. Corolla blue, purple, or white; stamens long-exserted; nutlets reticulate; soft-villous annual with oblong or oval, petioled leaves——2. TRICHOSTEMA.
Ovary of 4 distinct or nearly distinct carpels; style basal.
  Fertile stamens 2; flowers white, in dense axillary whorls.——19. LYCOPUS.
  Fertile stamens 4; flowers blue or whitish, in axillary clusters or interrupted spikes——20. MENTHA.

Corolla labiate.
Calyx broadly campanulate, exceeding the corolla, shallowly 5-toothed to entire. Corolla white, purple-lined or tinged; leaves long-petioled, rounded-subcordate; plant glabrous, 1 meter high or less.
12. MOLUCCELLA.
Calyx of a narrower type, distinctly toothed or bilabiate, not exceeding the corolla.
Calyx bilabiate, the lips entire.
Calyx enlarged and inflated in fruit. Shrubby, 0.6 to 1 meter high, the branches slender, divaricate, whitish, puberulent; leaves glabrate, ovate-lanceolate or oblong, mostly entire; corolla purple or whitish, 2 cm. long or more, puberulent; nutlets minutely muricate.
3. SALAZARIA.
Calyx with a helmet-like projection on the upper side.
4. SCUTELLARIA.
Calyx regular or nearly so, or if bilabiate, the lips toothed or lobed.
Calyx teeth 10, spiny, recurved at maturity. Woolly perennial; leaves suborbicular; flowers white or purplish, in axillary glomerules; nutlets smooth or granular_____**5. MARRUBIUM.**
Calyx teeth 5.
Bracts subtending the flower clusters pectinate with awn-pointed teeth. Puberulent annual or biennial; leaves lanceolate to ovate, coarsely serrate; flowers blue or purple; nutlets smooth.
8. MOLDAVICA.
Bracts subtending the flower clusters entire or ciliate.
Fertile stamens 2. Nutlets mostly smooth.
Calyx distinctly 2-lipped_____**14. SALVIA.**
Calyx regular or obscurely 2-lipped, 13 to 15-ribbed.
Flowers in dense axillary or terminal clusters. Throat of corolla dilated_____**15. MONARDA.**
Flowers in small axillary cymes or glomerules.
Plants herbs_____**16. HEDEOMA.**
Plants shrubs_____**17. POLIOMINTHA.**
Fertile stamens 4.
Floral bracts broad, membranous, conspicuous.
Calyx 2-lipped, 10-ribbed. Corolla purple or white; flowers in a dense terminal spike; bracts cuspidate; leaves ovate to lanceolate_____**9. PRUNELLA.**
Calyx nearly regular, 15-ribbed_____**18. MADRONELLA.**
Floral bracts inconspicuous or leaflike.
Leaves palmately cleft or parted, the lobes entire or toothed, 2 to 10 cm. long. Flowers white or pink, in axillary glomerules; nutlets smooth; robust plant, often 1 meter high.
11. LEONURUS.
Leaves entire, toothed, or incised, not palmately cleft.
Plants diffuse, branching from the base. Leaves (in our species) cordate or reniform, the upper clasping, crenate; calyx 5-ribbed; corolla purplish_____**10. LAMIUM.**
Plants mostly erect.
Plant a canescent shrub 1 meter high or more. Leaves ovate or rounded, crenate, often cordate; calyx tomentose; corolla violet, small_____**21. HYPTIS.**

Plants herbs.
Calyx 5 or 10-ribbed, more or less campanulate. Inflorescence raceme-like.
Upper lip of corolla very short, the lower 3-lobed. Villous-hirsute perennial; leaves ovate-oblong to lanceolate; corolla pink or white; nutlets united. **1. TEUCRIUM.**
Upper lip of corolla nearly equaling the lower. Nutlets distinct---------- **13. STACHYS.**
Calyx 15-ribbed, tubular or narrowly campanulate. Leaves cordate-ovate, toothed.
Calyx densely white-pubescent, the teeth long-spinulose; corolla white; flowers in axillary cymes. **7. NEPETA.**
Calyx sparingly pubescent, the teeth not long-spinulose; corolla pale pink to violet; flowers in spikelike panicles---------- **6. AGASTACHE.**

1. TEUCRIUM L. GERMANDER

1. **Teucrium occidentale** A. Gray, Syn. Fl. 2[1]: 349. 1878.

Artemisia, pinyon, and yellow pine belts. Ontario to Pennsylvania, westward to British Columbia and California.

2. TRICHOSTEMA L. BLUECURLS

1. **Trichostema oblongum** Benth. Labiat. Gen. Sp. 659. 1835.

Wet places of the yellow pine and aspen belts; Sierra Nevada. Washington and Idaho to Nevada and California.

3. SALAZARIA Torr.

1. **Salazaria mexicana** Torr. U. S. & Mex. Bound. Bot. 133. *pl. 39.* 1859.

Desert areas, rocky ravines, and hillsides of the Covillea belt. Southern Nevada and California, southward to Mexico.

4. SCUTELLARIA L. SKULLCAP

Leaves crenate, oblong to oblong-lanceolate, truncate or cordate at base, 2 to 4 cm. long. Corolla blue, rarely pink or white, 15 to 18 mm. long; plant strigose, 20 to 90 cm. high---------- **1. S. galericulata.**
Leaves entire or nearly so.
Corolla white or yellowish, 12 to 16 mm. long; plant puberulent, 10 cm. high or less, branching from the base. Roots bearing moniliform tubers; leaves obovate to spatulate---------- **5. S. nana.**
Corolla blue or violet; plants puberulent, 30 cm. high or less.
Leaves oblong or elliptic, obtuse, the base rounded or abruptly cuneate. Corolla 12 to 18 mm. long; plants diffusely branching from the base---------- **2. S. antirrhinoides.**
Leaves (except the lowest) linear to cuneate-oblong, gradually contracted into a short petiole.
Corolla 2 to 3 cm. long, with a more or less ample expanded throat; upper leaves linear to linear-oblong---------- **3. S. angustifolia.**
Corolla about 2 cm. long, gradually enlarged upward; leaves more or less uniform---------- **4. S. nevadensis.**

1. Scutellaria galericulata L. Sp. Pl. 599. 1753.

Moist places of the pinyon belt and upward to the spruce belt. Newfoundland to Alaska, southward to North Carolina, Ohio, and Arizona; also in Europe and Asia.

2. Scutellaria antirrhinoides Benth. in Edward's Bot. Reg. **18**: sub *pl. 1493*. 1832.

Plains and dry hillsides of the pinyon and yellow pine belts. Idaho and Oregon to Nevada and California.

3. Scutellaria angustifolia Pursh, Fl. Amer. Sept. 412. 1814.

Plains and mountain sides of the pinyon and yellow pine belts. British Columbia to Montana, Utah, and California.

4. Scutellaria nevadensis Eastw. Bull. Torrey Club **30**: 492. 1903.

Canyons and dry open ground of the artemisia, pinyon, and yellow pine belts. Nevada.

5. Scutellaria nana A. Gray, Proc. Amer. Acad. **11**: 100. 1876.

Moist places on plains and hillsides of the artemisia and pinyon belts. Nevada.

5. MARRUBIUM L. Hoarhound

1. Marrubium vulgare L. Sp. Pl. 583. 1753.

Waste places and on sheep ranges; introduced from Europe. Maine to North Carolina, westward to British Columbia and California.

6. AGASTACHE Clayt.

Calyx lobes ovate-lanceolate, 2 to 3 mm. long, rose-tinged; corolla pale pink; leaf blades ovate or cordate, 3 to 5 cm. long, puberulent. **1. A. pallidiflora.**

Calyx lobes elongate-lanceolate, acuminate, 4 to 5 mm. long; corolla rose or violet; leaf blades cordate, glabrous or puberulent_____**2. A. urticifolia.**

1. Agastache pallidiflora (Heller) Rydb. Bull. Torrey Club **33**: 150. 1906.

Brittonastrum pallidiflorum Heller, Bull. Torrey Club **26**: 621. 1899.

Yellow pine, aspen, and spruce belts; southwestern Colorado. Colorado, New Mexico, and Arizona.

2. Agastache urticifolia (Benth.) Kuntze, Rev. Gen. Pl. 511. 1891.

Lophanthus urticifolius Benth. in Lindl. Bot. Reg. **15**: sub *pl. 1282*. 1829.

Yellow pine, aspen, and spruce belts. Montana to Colorado, westward to British Columbia and California.

7. NEPETA L. Catnip

1. Nepeta cataria L. Sp. Pl. 570. 1753.

Waste places; introduced from Europe. New Brunswick to Virginia, westward to New Mexico and Washington.

8. MOLDAVICA Adans. Dragonhead

1. Moldavica parviflora (Nutt.) Britton in Britt. & Brown, Illustr. Fl. ed. 2. **3**: 114. 1913.

Dracocephalum parviflorum Nutt. Gen. Pl. **2**: 35. 1818.

Plains and slopes of the artemisia belt, upward to the spruce belt. New York to Alaska, southward to New Mexica and Arizona.

9. PRUNELLA L. Selfheal

1. Prunella vulgaris L. Sp. Pl. 600. 1753.

Waste places, canyons, and on mountain sides, upward to the spruce belt. Throughout temperate North America, Asia, and Europe.

10. LAMIUM L. Deadnettle

1. Lamium amplexicaule L. Sp. Pl. 579. 1753.

Waste places and cultivated ground; introduced from Europe. New Brunswick to Florida, westward to California.

11. LEONURUS L. Motherwort

1. Leonurus cardiaca L. Sp. Pl. 584. 1753.

Waste places and cultivated ground; introduced from Europe.

12. MOLUCCELLA L. Molucca-balm

1. Moluccella laevis L. Sp. Pl. 587. 1753.

In cultivation; escaped near Washington, Utah. Native of western Asia.

13. STACHYS L. Betony

Plant lanate or soft-tomentose; leaves ovate or oblong, often cordate, crenate; calyx lobes shorter than the tube; corolla white_____**1. S. albens.**
Plant hirsute or pubescent; leaves oblong-lanceolate, serrate; calyx lobes shorter than the tube; corolla rose-colored or purplish__**2. S. scopulorum.**

1. Stachys albens A. Gray, Proc. Amer. Acad. 7: 387. 1868.

Wet ground in the yellow pine and aspen belts; Sierra Nevada. California and western Nevada.

2. Stachys scopulorum Greene, Pittonia 3: 342. 1898.

Artemisia, pinyon, and yellow pine belts. Alberta to Washington, southward to New Mexico.

14. SALVIA L. Sage

Flowers racemose, purplish, the subtending bracts small. Puberulent annual, 10 to 40 cm. high; leaves oblong-lanceolate to linear__**1. S. lanceaefolia.**
Flowers in pedunculate heads or axillary verticels.
  Leaves once or twice pinnatifid, the divisions crenate. Flowers in pedunculate heads, the bracts ovate, spinulose; corolla blue; annual, 10 to 50 cm. high, strigose or hispidulous_____**2. S. columbariae.**
  Leaves simple. Perennials; flowers glomerate or in bracted spikes.
    Leaves acuminate, rhomboid to ovate, spinulose-toothed or entire, prominently ribbed, tomentose. Flowers blue, in a dense bracted spike; floral bracts spinulose; tufted perennial with flaky whitish bark. **3. S. funerea.**

    Leaves obtuse or acute.
      Leaves crenulate, rugose, acutish, oblong; flowers in solitary heads, the subtending bracts ovate or oval, whitish; cinereous-puberulent undershrub_____**4. S. mohavensis.**
      Leaves entire, obtuse; flowers in interrupted spikes, the subtending bracts obovate; cinereous undershrubs. Leaves oblong-spatulate to rounded-obovate.
        Inflorescence puberulent_____**5. S. carnosa.**
        Inflorescence villous-pubescent_____**5a. S. carnosa pilosa.**

1. **Salvia lanceaefolia** Poir. in Lam. Encycl. Suppl. **5**: 49. 1817.
Artemisia, pinyon, and yellow pine belts. South Dakota and Montana, southward to Texas and Mexico.

2. **Salvia columbariae** Benth. Labiat. Gen. Sp. 302. 1833.
Covillea and artemisia belts. California and Nevada to Arizona.

3. **Salvia funerea** Jones, Contr. West. Bot. **12**: 71. 1908.
Among rocks of the Covillea belt; Funeral Mountains, southeastern California.

4. **Salvia mohavensis** Greene, Pittonia **2**: 235. 1892.
Mountain sides of the Covillea belt; Providence Mountains, California.

5. **Salvia carnosa** Dougl. in Lindl. Bot. Reg. **17**: *pl. 1469*. 1831, as synonym; H. M. Hall, Univ. Calif. Publ. Bot. **1**: 111. 1902.
Audibertia incana Benth. in Lindl. Bot. Reg. **17**: *pl. 1469*. 1831. Not *Salvia incana* Mart. & Gal. 1844.
Audibertiella argentea Rydb. Bull. Torrey Club **36**: 683. 1909.
Covillea, artemisia, and pinyon belts. Washington to California, eastward to Utah and Arizona.

5a. **Salvia carnosa pilosa** (A. Gray) H. M. Hall.
Audibertia incana pilosa A. Gray, Syn. Fl. ed. 2. **2**[1]: 461. 1886.
Desert areas; Mohave Desert. Southern California.

15. MONARDA L. Beebalm

Heads of flowers in the axils of the upper leaves. Corolla ochroleucous, 15 to 18 mm. long; leaves lanceolate or oblanceolate, serrulate, strigillose or glabrate ..... **3. M. pectinata.**
Heads of flowers solitary at the ends of the stem and branches. Plants strigose or puberulent.
Leaf blades ovate or lanceolate, the base cordate or rounded, serrate; corolla rose-colored or lilac ..... **1. M. menthaefolia.**
Leaf blades lanceolate, the base rounded or truncate, serrulate; corolla purple ..... **2. M. stricta.**

1. **Monarda menthaefolia** Graham, Edinburgh New Phil. Journ. **1829**: 347. 1829.
Artemisia belt, upward to the aspen belt. Saskatchewan and Alberta, southward to Illinois, Texas, and Utah.

2. **Monarda stricta** Wooton, Bull. Torrey Club **25**: 263. 1898.
Yellow pine belt. Colorado and New Mexico to eastern Utah and Arizona.

3. **Monarda pectinata** Nutt. Journ. Acad. Phila. II. **1**: 182. 1848.
Artemisia, pinyon, and yellow pine belts. Nebraska to Texas, westward to Utah and Arizona.

16. HEDEOMA Pers.

Floral leaves oblong to linear or bractlike, shorter than the calyx. Stems retrorse-puberulent, 10 to 20 cm. high; corolla surpassing the calyx; leaves broadly to narrowly oval, 7 to 15 mm. long ..... **2. H. nana.**
Floral leaves ovate, short-petioled, barely 4 mm. long, nearly equaling the calyx. Stems prostrate, retrorse-hispidulous, 10 cm. long or less; leaves somewhat hispidulous, round-ovate, not over 5 mm. long ..... **1. H. diffusa.**

1. **Hedeoma diffusa** Greene, Pittonia **3**: 338. 1898.
Covillea, artemisia, and yellow pine belts. Nevada and Arizona.

2. **Hedeoma nana** (Torr.) Briq. in Engl. & Prantl. Pflanzenfam **4**[3a]: 294. 1896.
Hedeoma dentata nana Torr. U. S. & Mex. Bound. Bot. 130. 1859.
Rocky places of the pinyon and yellow pine belts. Western Texas to Nevada and southward.

17. POLIOMINTHA A. Gray

1. **Poliomintha incana** (Torr.) A. Gray, Proc. Amer. Acad. **8**: 296. 1870.
Hedeoma incana Torr. U. S. & Mex. Bound. Bot. 130. 1859.
Covillea and artemisia belts. Western Texas to southern Utah, southward to Mexico.

18. MADRONELLA Greene

Plants annual, 10 to 30 cm. high, glabrous or puberulent. Leaves lance-oblong; floral bracts acute or obtuse; calyx hirsute within; corolla rose-colored. **1. M. lanceolata.**

Plants perennials.
Floral bracts hispidulous, at most ciliolate. Leaves linear-oblong, glaucous; corolla purplish **2. M. linoides.**
Floral bracts ciliate.
Bracts 6 mm. long or less, purplish. Corolla lilac-purple; leaves lance-oblong to lance-ovate **3. M. parvifolia.**
Bracts 8 mm. long or more.
Bracts elliptic, acute, reddish. Corolla red-purple; upper leaves sub-orbicular to linear-oblong **4. M. epilobioides.**
Bracts ovate, obtuse or acutish.
Bracts distinctly muriculate, reddish, ovate, acute. Corolla pale purple; leaves lance-oblong **5. M. muriculata.**
Bracts not muriculate. Calyx puberulent, the teeth setose; corolla white or pale purple.
Leaves lance-oblong or oblong, distinctly petioled **6. M. rubella.**
Leaves ovate to lance-ovate, petioled or subsessile. **7. M. sheltonii.**

1. **Madronella lanceolata** (A. Gray) Greene, Leaflets **1**: 169. 1906.
Monardella lanceolata A. Gray, Proc. Amer. Acad. **11**: 102. 1876.
Yellow pine belt; Sierra Nevada. California and western Nevada.

2. **Madronella linoides** (A. Gray) Greene, Leaflets **1**: 169. 1906.
Monardella linoides A. Gray, Proc. Amer. Acad. **11**: 101. 1876.
Rocky canyons of the Covillea belt; southeastern California.

3. **Madronella parvifolia** (Greene) Rydb. Bull. Torrey Club **33**: 150. 1906.
Monardella parvifolia Greene, Pl. Baker. **3**: 22. 1901.
Yellow pine, aspen, and spruce belts. Colorado and New Mexico to Utah and Arizona.

4. **Madronella epilobioides** Greene, Leaflets **1**: 169. 1906.
Canyons and mountain sides of the yellow pine and aspen belts. Southern California and Nevada.

5. **Madronella muriculata** Greene, Leaflets **1**: 169. 1906.
Yellow pine, aspen, and spruce belts. Nevada and California.

6. **Madronella rubella** Greene, Leaflets **1**: 169. 1906.
Madronella oblongifolia Rydb. Bull. Torrey Club. **36**: 686. 1909.
Yellow pine, aspen, and spruce belts. Utah, Idaho, and Nevada.

7. Madronella sheltonii (Torr.) Greene, Leaflets **1**: 169. 1906.
Monardella sheltonii Torr.; Durand, Journ. Acad. Phila. n. ser. **3**: 99. 1855.
? Madronella sessilifolia Rydb. Bull. Torrey Club **36**: 685. 1909.
Artemisia belt, upward to the aspen belt. Nevada and Utah.

19. LYCOPUS L. Bugleweed

Leaves sinuate-pinnatifid, lanceolate, acuminate, petiolate; calyx teeth triangular-subulate; corolla equaling or slightly exceeding the calyx; plants not stoloniferous ..... **1. L. americanus.**
Leaves more or less sharply serrate, oblong-lanceolate, acute, sessile or nearly so; calyx teeth subulate-lanceolate; corolla slightly exceeding the calyx; plants stoloniferous ..... **2. L. lucidus.**

1. Lycopus americanus Muhl.; Barton, Fl. Phila. Prodr. 15. 1815.
Wet places of the artemisia belt, upward to the aspen belt. Newfoundland to Florida, westward to British Columbia and California.

2. Lycopus lucidus Turcz.; Benth. in DC. Prodr. **12**: 178. 1848.
Moist meadows and canyons of the artemisia, pinyon, and yellow pine belts. Nebraska and Kansas, westward to Arizona, California, and British Columbia; also in Asia.

20. MENTHA L. Mint

Whorls of flowers in terminal spikes 5 to 10 cm. long. Calyx teeth subulate; corolla glabrous; plants 30 to 50 cm. high; leaves lanceolate, serrate, sessile or nearly so ..... **1. M. spicata.**
Whorls of flowers axillary.
Plants more or less villous, 30 to 60 cm. high; leaves ovate to lanceolate, petioled; calyx villous, the teeth lanceolate; corolla pink or rose-colored, pubescent ..... **2. M. lanata.**
Plants glabrous or nearly so, 20 to 40 cm. high; leaves ovate-elliptic to ovate-lanceolate, serrate, acute; calyx pubescent; corolla pink, pubescent ..... **3. M. penardi.**

1. Mentha spicata L. Sp. Pl. 576. 1753. Spearmint.
About settlements; introduced from Europe. Nova Scotia to Florida, westward to British Columbia and California.

3. Mentha penardi (Briq.) Rydb. Bull. Torrey Club **33**: 150. 1906.
Mentha arvensis lanata Piper, Bull. Torrey Club. **29**: 223. 1902.
Wet places of the yellow pine and aspen belts. British Columbia to Nevada and California.

3. Mentha penardi (Briq.) Rydb. Bull. Torrey Club **33**: 150. 1906.
Mentha arvensis penardi Briq. Bull. Herb. Boiss. **3**: 215. 1895.
Wet meadows of the Covillea belt, upward to the aspen belt. Nebraska to Arizona, northwestward to British Columbia.

21. HYPTIS Jacq.

1. Hyptis emoryi Torr. in Ives, Rep. Colo. Riv. 20. 1860.
Covillea belt; Needles. Arizona and southern California to Mexico

114. SCROPHULARIACEAE. Figwort Family

Herbs or shrubs with opposite, verticillate, or alternate, estipulate leaves; flowers mostly irregular; calyx 4 or 5-lobed; corolla gamopetalous, usually 2-lipped; stamens 2, 4, or 5, usually didynamous; styles usually united; ovary 2-celled; ovules numerous, borne on axial placentae; seeds few to numerous.

Corolla spurred, saccate, or gibbous at base.
Corolla tube spurred. Flowers spicate——2. **LINARIA.**
Corolla tube saccate or gibbous.
Fertile stamens 2 (posterior pair reduced to small filaments); seeds winged; corolla campanulate——3. **MOHAVEA.**
Fertile stamens 4; seeds without wings; corolla funnelform.
4. ANTIRRHINUM.

Corolla not spurred.
Corolla rotate, little if at all bilabiate.
Stamens 5——1. **VERBASCUM.**
Stamens 2 (rarely 4). Capsule compressed, emarginate or lobed.
14. VERONICA.
Corolla broadly campanulate to tubular, nearly regular to 2-lipped.
Leaves prevailingly alternate, the lowest often opposite (stem leaves often much reduced in *Synthyris*).
Calyx spathaceous, diphyllous or monophyllous. Corolla tubular, slightly 2-lipped; capsule compressed——18. **ADENOSTEGIA.**
Calyx 4 or 5-lobed or toothed.
Lips of corolla subequal, or corolla nearly regular.
Lower lip of corolla 1 to 3-saccate——19. **ORTHOCARPUS.**
Lower lip of corolla not at all saccate——15. **SYNTHYRIS.**
Lips of corolla very unequal, the upper often curved.
Corolla somewhat campanulate, 4 to 6 cm. long, purplish. Tall introduced plant with ovate to obovate, serrate leaves; inflorescence often 30 cm. long——16. **DIGITALIS.**
Corolla tubular, often distinctly beaked or hooded. Stamens didynamous.
Flowers in leafy spikes; anthers unequal; seeds reticulate.
17. CASTILLEJA.
Flowers in terminal spikes or racemes; anthers alike; seeds pitted or striate——20. **PEDICULARIS.**

Leaves prevailingly opposite, verticillate, or basal.
Plants acaulescent, creeping by slender runners. Leaves rosulate; corolla nearly regular; capsule many-seeded; seeds rugulose.
12. LIMOSELLA.
Plants caulescent. Calyx mostly 5-lobed or toothed; stamens 2, 4, or 5.
Antheriferous stamens 2.
Sterile filaments simple, included; plant 10 to 20 cm. high, viscid-puberulent to glabrate above; corolla light yellow to whitish, 8 to 10 mm. long——10. **GRATIOLA.**
Sterile filaments 2-forked, exserted; plant diffusely spreading, 10 cm. high or less, glabrous; corolla violet to bluish white, about 6 mm. long——13. **ILYSANTHES.**
Antheriferous stamens 4, the fifth stamen, if present, sterile.
Sterile stamen elongate, conspicuous, filiform to spatulate.
Inflorescence thyrsoid; calyx deeply 5-parted or of distinct sepals.
Seeds not winged——7. **PENTSTEMON.**
Inflorescence simply spicate; calyx not deeply cleft. Plant 10 cm. high or less, glabrous or puberulent; basal leaves spatulate or oblanceolate, the stem leaves small, linear.
8. CHIONOPHILA.

Sterile stamen, if present, scalelike or glandlike.
Flowers crowded in terminal spikes or racemes. Corolla hooded or beaked——20. **PEDICULARIS.**

Flowers solitary on axillary peduncles, loosely racemose, or paniculate.
Plants perennial, 50 to 150 cm. high; flowers paniculate. Corolla 2-lipped, purple or yellowish; seeds rugose. **6. SCROPHULARIA.**
Plants annual or perennial, rarely 50 cm. high; flowers axillary or loosely racemose.
Corolla gibbous at base, violet, blue, or white. **5. COLLINSIA.**
Corolla not gibbous at base.
Calyx gamosepalous, angled; corolla 2-lipped, yellow or red. **9. MIMULUS.**
Calyx of distinct unequal sepals; corolla nearly regular, blue or white. Succulent perennial with rounded-obovate, palmately veined leaves_____**11. MONNIERA.**

1. VERBASCUM L. MULLEIN

Plant densely woolly, 0.5 to 1.5 meters high; leaves decurrent, oblong to obovate-oblong, 10 cm. long or more; flowers yellow, in a dense spike 20 cm. long or more_____**1. V. thapsus.**
Plant sparingly pubescent or glabrate; stem reddish; leaves green, oblong, doubly serrate to lyrate-pinnatifid, the lower petioled, the upper ovate to oblong, sessile, serrate; flowers yellow or tinged with purple, loosely racemose_____**2. V. blattaria.**

1. Verbascum thapsus L. Sp. Pl. 177. 1753. COMMON MULLEIN.

About settlements and along railroads; introduced from Europe. Nova Scotia to British Columbia, southward to Florida and California.

2. Verbascum blattaria L. Sp. Pl. 178. 1753. MOTH MULLEIN.

About settlements throughout the United States; reported from states surrounding the Great Basin; introduced from Europe.

2. LINARIA L. TOADFLAX

Flowers yellow, 2 to 3 cm. long; calyx deeply cleft, 4 mm. long; leaves numerous linear, alternate; plant erect, glabrous, 1 meter high or less. **1. L. vulgaris.**
Flowers blue, 6 mm. long or less; calyx deeply cleft, 3 mm. long; leaves scattered, linear; plant decumbent at base, 20 to 80 cm. high. **2. L. canadensis.**

1. Linaria vulgaris Mill. Gard. Dict. ed. 8. *Linaria* No. 1. 1768.

COMMON TOADFLAX.

Antirrhinum linaria L. Sp. Pl. 616. 1753.

Waste places; Filmore National Forest. Introduced from Europe. Newfoundland to Georgia, westward to Manitoba and New Mexico.

2. Linaria canadensis (L.) DuM. Bot. Cult. 2: 96. 1802.

Antirrhinum canadense L. Sp. Pl. 618. 1753.

Fields and pastures. Reported from the region immediately south of our range. Nova Scotia to Florida, westward to Oregon and California.

LINARIA ELATINE (L.) Mill. Gard. Dict. ed. 8. *Linaria* No. 16. 1768.

Antirrhinum elatine L. Sp. Pl. 612. 1753.

A prostrate pubescent annual with stems 15 to 60 cm. long and with solitary, axillary, yellow or purplish flowers. It has been reported from Hoopa Valley, California; it is naturalized in the Eastern States as far as Missouri and may extend across the continent.

3. MOHAVEA A. Gray

Corolla about 3 cm. long, light yellow with purple dots, bearded within, the lobes broad, erose-denticulate; annual, 60 cm. high or less, pubescent and viscid; leaves lanceolate, entire ..... 1. M. viscida.
Corolla about 2 cm. long, yellow, the lobes entire or slightly undulate, pubescent within; annual, 12 cm. high or less, viscid and glandular-pubescent; leaves oblong-lanceolate ..... 2. M. breviflora.

1. **Mohavea viscida** A. Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 122. 1857.
Desert areas and rocky canyons of the Covillea belt. Southern California, Arizona, and southern Nevada.

2. **Mohavea breviflora** Coville, Contr. U. S. Nat. Herb. **4**: 168. *pl. 17*. 1893.
Desert areas and dry canyons of the Covillea belt. Southern Nevada and southern California.

4. ANTIRRHINUM L. Snapdragon

Stem erect, 10 to 40 cm. high; leaves linear to narrowly lanceolate, 1 to 3 cm. long; corolla whitish; calyx glandular-hirsute; capsule oblique, subglobose. 1. A. kingii.
Stem climbing, 50 to 100 cm. long or more; leaves ovate to linear, 1 cm. long or more; corolla bright yellow; calyx glabrous or nearly so; capsule globose ..... 2. A. filipes.

1. **Antirrhinum kingii** S. Wats. in King, Geol. Expl. 40th Par. **5**: 215. *pl. 21, f. 1–4*. 1871.
Plains and canyons of the artemisia belt. Western Utah to Oregon and California.

2. **Antirrhinum filipes** A. Gray in Ives, Rep. Colo. Riv. 19. 1860.
Canyons and dry hillsides of the Covillea and the artemisia belts. Southern Utah and Arizona to southern California.

5. COLLINSIA Nutt.

Cotyledons round, about 5 mm. in diameter; leaves oblong or linear-lanceolate, 1 to 2 cm. long; flowers in axillary whorls (1 to 5 in each whorl); plant 7 to 15 cm. high, branching above the cotyledons ..... 1. C. tenella.
Cotyledons spatulate, 15 mm. long; leaves linear-lanceolate, 1 to 3 cm. long; flowers in axillary whorls (1 to 3 in each whorl); plant 4 to 6 cm. high, branching from the axils of the leaves (including the cotyledons). 2. C. brachysiphon.

1. **Collinsia tenella** (Pursh) Piper, Contr. U. S. Nat. Herb. **11**: 496. 1906.
Antirrhinum tenellum Pursh, Fl. Amer. Sept. 421. 1814.
Foothills and canyons of the pinyon, yellow pine, aspen, and spruce belts. Ontario to British Columbia, southward to New Mexico and California.

2. **Collinsia brachysiphon** Eastw. Bull. Torrey Club **32**: 214. 1905.
Rocky or sandy places among *Arctostaphylos* and coniferous species at 2,100 meters or more. California and adjacent Nevada.

6. SCROPHULARIA L. Figwort

Calyx lobes broadly ovate, rounded; sterile filament reniform, stipitate; leaves ovate, truncate or cordate, sharply and doubly serrate or incised; plant 1 to 1.5 meters high, glandular above, glabrous below ..... 1. S. occidentalis.

Calyx lobes triangular-ovate, acute or obtusish; sterile filament spatulate or cuneiform; leaves ovate or ovate-oblong, truncate, cordate, or deltoid at base, doubly serrate or incised; plant 0.6 to 1 meter high, pubescent, glandular above----------2. S. californica.

1. Scrophularia occidentalis (Rydb.) Bicknell, Bull. Torrey Club **23**: 315. 1896.
Scrophularia nodosa occidentalis Rydb. Contr. U. S. Nat. Herb. **3**: 517. 1896.

Moist soil along watercourses in canyons of the pinyon, yellow pine, aspen, and spruce belts. North Dakota to Colorado, westward to California and Washington.

2. Scrophularia californica Cham. Linnaea **2**: 585. 1827.

Moist ravines and canyons of the pinyon, yellow pine, and aspen belts. British Columbia to California and western Nevada.

7. PENTSTEMON Schmidel. PENTSTEMON

Anthers horseshoe-shaped, opening at the top only. Corolla glabrous; sterile filament glabrous or nearly so; plants shrubby at base; leaves entire. (SACCANTHERA.)

Corolla scarlet, 25 mm. long, strongly bilabiate, the lower lip reflexed. Stems glabrous below; upper leaves oblanceolate to spatulate or linear.

Uppermost leaves tapering to the base----------1. P. bridgesii.
Uppermost leaves auriculate----------1a. P. bridgesii amplexicaulis.

Corolla blue or violet.

Inflorescence open, more or less glandular-viscid or puberulent. Plants 15 to 60 cm. high.

Corolla slender-funnelform, blue or violet, 12 mm. long or more, the pedicels short. Leaves green and glabrous, the upper lanceolate or oblong to linear----------2. P. gracilentus.

Corolla ventricose-funnelform, the pedicel slender.

Leaves green, glabrous or nearly so, linear to oblanceolate; corolla 12 to 16 mm. long, pale blue to violet----------3. P. roezli.

Leaves grayish-pubescent, oblanceolate; corolla about 18 mm. long, purple----------4. P. cinerascens.

Inflorescence glabrous or pubescent.

Sepals broadly ovate, obtuse or acutish. Corolla violet, 25 mm. long; leaves linear to narrowly lanceolate----------5. P. sepalulus.

Sepals lanceolate, acute or acuminate.

Corolla about 16 mm. long, purple. Leaves oblanceolate to spatulate, glabrous or puberulent----------8. P. kingii.

Corolla 20 mm. long or more.

Leaves lanceolate to oblong-lanceolate; corolla 25 mm. long or more, pale violet----------6. P. platyphyllus.

Leaves narrowly lanceolate or oblanceolate; corolla 20 mm. long, bluish violet----------7. P. leonardi.

Anthers opening their whole length or nearly so. (EUPENTSTEMON.)

Anthers densely bearded with long villous hairs. Plants low, suffruticose; leaves coriaceous; calyx 8 mm. long or more.

Leaf margin entire or with few teeth, the blades obovate, 5 to 12 mm. long, glabrous. Corolla tubular, lilac, 25 mm. long.

9. P. davidsonii.

Leaf margin serrate or serrulate. Corolla tubular or moderately expanded above, about 30 mm. long; leaves ovate to elliptic, the upper sessile.

Stems sparingly puberulent; leaves glabrous or nearly so.

10. P. newberryi.

Plant puberulent or glandular throughout----------11. P. montanus.

Anthers sparingly villous (in tall erect species), hirsutulous, or glabrous.
Corolla much inflated above, white tinged with pink, or rose-colored, 30 mm. long, the inflated part 15 mm. broad or more. Upper leaves ovate, acuminate, sessile, serrate; plants 60 cm. high or more, glabrous and glaucous.
Calyx sparingly pubescent or glandular, equaling the corolla tube. **40. P. palmeri.**
Calyx pubescent or glandular, commonly half as long as the corolla tube **41. P. macranthus.**
Corolla tubular to moderately inflated, the inflated part 12 mm. broad or less.
Corolla scarlet, tubular or nearly so, 25 to 35 mm. long.
Corolla obscurely bilabiate, the lower lip not reflexed. Stem leaves ovate-lanceolate or oblong, clasping, obtuse to acuminate.
Stem and leaves glabrous or nearly so **15. P. eatoni.**
Stem and leaves puberulent **15a. P. eatoni undosus.**
Corolla strongly bilabiate, the lower lip 3-parted and reflexed.
Lower lip of corolla bearded. Anthers glabrous.
Stem and leaves glabrous **18. P. barbatus.**
Stem and leaves puberulent **18a. P. barbatus puberulus.**
Lower lip of corolla not bearded.
Anthers glabrous; leaves usually glabrous **16. P. torreyi.**
Anthers long-bearded; leaves often puberulent. **17. P. trichander.**
Corolla blue, purple, yellow, or white, if red 20 mm. long or less.
Leaf margin regularly serrate or serrulate (occasionally entire or few-toothed in no. 14).
Corolla 15 to 25 mm. long.
Plant puberulent, about 10 cm. high; branches numerous; leaves ovate to elliptic, 2 to 4 cm. long, petioled; corolla purple. **38. P. petiolatus.**
Plants glabrous, 60 cm. high or more. Leaves ovate to oblong; corolla 9 to 12 mm. broad, rose-purple or lilac.
Upper leaves connate-perfoliate **42. P. spectabilis.**
Upper leaves not connate-perfoliate **43. P. floridus.**
Corolla 12 mm. long or less.
Leaves coarsely spinulose-toothed, ovate to lanceolate or oblanceolate. Corolla ochroleucous, tinged with purple; plants glabrous,, 20 cm. high or more.
Peduncles 5 to 10 mm. long; leaves 6 cm. long or less. **56. P. deustus.**
Peduncles obsolete; leaves 2 cm. long or less, only the lower ones toothed **56a. P. deustus pedicellatus.**
Leaves serrulate or wavy-toothed, not spinulose.
Plant puberulent throughout, shrubby at base, the branches slender. Leaves ovate or ovate-oblong, 1 cm. long or less; corolla flesh-colored **13. P. rothrockii**
Plants glabrous (at least below), 2 meters high or less, the branches virgate.
Leaves narrowly oblong or lanceolate, 2 cm. long or more; corolla yellow or flesh-colored, 12 to 15 mm. long. **12. P. breviflorus.**
Leaves ovate or ovate-lanceolate, 2 cm. long or less; corolla flesh-colored. 12 mm. long **14. P. lemmon**

Leaf margin entire, wavy, or with few scattered teeth.
Anthers more or less villous.
Sepals 7 to 10 mm. long, acuminate, scarious and erose below.
Corolla 30 mm. long, blue; leaves oblanceolate to lanceolate.
24. P. strictiformis.
Sepals 4 to 6 mm. long, acute or obtuse.
Plant puberulent. Upper leaves oval to oblanceolate or linear; corolla 25 mm. long----------**23. P. comarrhenus.**
Plants glabrous (at least below).
Corolla 25 to 30 mm. long, strongly ventricose. Sepals ovate, obtuse or acute; leaves oval to spatulate or linear.
22. P. strictus.
Corolla 15 to 20 mm. long, moderately or scarcely ventricose.
Upper leaves lanceolate to narrowly lanceolate; sepals acute, scarious and erose----------**25. P. garrettii.**
Upper leaves oval or spatulate to lanceolate; sepals ovate, acute, scarious, entire----------**26. P. cyanocaulis.**
Anthers glabrous or at most hirsutulous.
Leaves conspicuously white-margined, elliptic or obovate-oblong, cuneate. Sepals oblong-lanceolate, scarious; stems numerous, from a thick caudex----------**39. P. albomarginatus.**
Leaves inconspicuously or not at all white-margined.
Corolla salverform, the lobes oval-orbicular. Stems slender, branching above, glabrous, woody at base; leaves linear to filiform.
Corolla tube 10 to 15 mm. long, the throat little dilated.
64. P. ambiguus.
Corolla tube 5 mm. long or less, the throat dilated.
65. P. thurberi.
Corolla funnelform, more or less dilated, not salverform.
Plants low, cespitose, commonly less than 15 cm. high, puberulent, often forming mats. Corolla nearly tubular or narrowly funnelform.
Leaves linear-spatulate, 6 to 15 mm. long. Corolla 15 mm. long.
Leaves green, glabrous or puberulent; sepals scarious, lanceolate, acuminate----------**63. P. abietinus.**
Leaves cinereous-puberulent; sepals acuminate.
Sepals not scarious----------**58. P. incanus.**
Sepals scarious and erose----------**62. P. coloradensis.**
Leaves lanceolate to oblanceolate, obovate, or orbicular.
Anthers explanate; sepals acuminate.
Leaves green, glabrous or sparingly puberulent, obovate, 10 mm. long. Corolla 15 mm. long, tubular-funnelform----------**61. P. suffrutescens.**
Leaves cinereous-puberulent.
Leaves 5 to 15 mm. long, obovate to broadly oblanceolate.
Corolla 15 to 20 mm. long, tubular-funnelform.
60. P. caespitosus.
Leaves commonly 20 mm. long, more or less oblanceolate to spatulate.
Sepals 5 mm. long; corolla 15 mm. long, tubular-funnelform----------**59. P. thompsoniae.**
Sepals 7 to 9 mm. long; corolla somewhat inflated, 15 to 18 mm. long----------**35. P. dolius.**

Plants taller, erect, scarcely if at all cespitose.
All leaves narrowly linear to linear-spatulate. Corolla dilated-funnelform, 12 to 15 mm. long; plants puberulent.
50. P. oreganus.
All leaves not of linear type.
Anther sacs divergent, dehiscent nearly to the apex, not peltately explanate after dehiscence.
Corolla 15 to 20 mm. long.
Corolla obscurely bilabiate, the throat narrowly funnelform.
Corolla red; sepals ovate, acute; leaves oblanceolate to linear-oblong, glabrous.
19. P. utahensis.
Corolla bluish purple; sepals ovate-oblong, acute; leaves lanceolate to spatulate, puberulent.
20. P. fremontii.
Corolla evidently bilabiate, the throat widened.
Plant 5 to 10 cm. high. Leaves obovate-oblanceolate_____**34. P. parvus.**
Plants 15 cm. high or more.
Sepals broadly ovate, acute, scarious; leaves oblanceolate to linear, glabrous.
31. P. uintahensis.
Sepals ovate, acute or acuminate. Plants puberulent.
Leaves prevailingly lanceolate, 7 cm. long or less_____**27a. P. cyananthus subglaber.**
Leaves prevailingly oblanceolate, 12 cm. long or less_____**33. P. tidestromii.**
Corolla 20 to 35 mm. long, evidently bilabiate (except in no. 21).
Sepals 8 to 10 mm. long, acuminate, scarious, erose.
Corolla dark blue, abruptly ventricose; leaves oblanceolate to oblong-lanceolate.
Plant puberulent_____**28. P. kennedyi.**
Plant glabrous_____**29. P. speciosus.**
Sepals 7 mm. long or less.
Stem and leaves glabrous.
Sepals broadly ovate, scarious, erose, abruptly acuminate. Stem leaves oblong to broadly lanceolate, cordate, 15 mm. broad or less.
29. P. speciosus.
Sepals lanceolate-acuminate, entire.
Stem leaves ovate to oblong, subcordate, 2 cm. broad or more; anther sacs hirsutulous.
27. P. cyananthus.
Stem leaves lanceolate, 2 cm. broad or less; anther sacs glabrous or hirsutulous.
30. P. subglaber.
Stem and leaves puberulent, at least partly so.
Anthers hirsutulous. Leaves obovate to oblanceolate, cordate-ovate above; sepals obovate, abruptly pointed, scarious, erose.
21. P. jonesii.

Anthers glabrous. Plant 30 cm. high or less; leaves oblong to oblong-lanceolate; sepals scarious, acuminate_____**32. P. wardii.**

Anther sacs dehiscent from base to apex, open after dehiscence and usually explanate, mostly 1-celled. Sepals 7 to 10 mm. long, scarcely if at all scarious. Corolla 15 to 20 mm. long, glandular-puberulent. Stem and inflorescence cinereous-puberulent; leaves ovate-lanceolate to oblanceolate; plant 12 cm. high or less_____**35. P. dolius.**

Stem and inflorescence glandular-puberulent; leaves lanceolate, the lower petioled; plant 10 to 30 cm. high_____**37. P. ophianthus.**

Corolla 20 to 30 mm. long. Plant perfectly glabrous, 20 to 40 cm. high; upper leaves and bracts cordate-ovate, abruptly acuminate; corolla blue or purple, 20 mm. long. **44. P. acuminatus.**

Plant glabrous up to the inflorescence; leaves ovate-lanceolate to linear-lanceolate, acuminate; corolla bilabiate, white, rose, or purplish. **55. P. whippleanus.**

Sepals 6 mm. long or less. Corolla 10 to 20 mm. long. Sepals broadly ovate, obtuse or abruptly short-pointed. Plant low, glabrous; leaves lanceolate to oblong; inflorescence verticillate-capitate; corolla about 10 mm. long, tubular____**46. P. chionophilus.**

Plant 30 to 50 cm. high, glabrous; leaves lanceolate, acuminate; inflorescence interrupted, the lower clusters long-pedunculate; corolla 12 to 15 mm. long, violet-purple_____**54. P. watsoni.**

Sepals narrower, acute or acuminate. Inflorescence verticillate-capitate, the clusters more or less interrupted. Corolla tubular-funnelform. Outer face of the corolla and calyx glandular-puberulent. Suffrutescent, 10 to 20 cm. high; leaves oval to oblong; corolla 15 mm. long, purplish; sepals lanceolate, entire. **57. P. heterodoxus.**

Outer face of the corolla glabrous. Corolla 10 mm. long, the throat 2 mm. wide or less. Leaves oblanceolate to linear-lanceolate, glabrous; sepals obovate, cuneate, acute or acuminate, scarious. **47. P. procerus.**

Corolla 10 to 15 mm. long, the throat 2.5 mm. wide or more. Sepals long-pointed, the margin broadly scarious, lacerate; leaves oblanceolate to lanceolate, entire_____**48. P. rydbergii.**

Sepals short-pointed, the margin narrowly scarious, more or less erose; leaves oblong to linear-lanceolate.
49. P. washoensis.

Inflorescence thyrsoid, the clusters more or less peduncled.

Plants glabrous (at least below).

Plant 30 to 60 cm. high; leaves oval to oblong; sepals ovate, acute, scarious-margined; corolla 15 to 20 mm. long, blue (?).
45. P. pachyphyllus.

Plant 10 to 20 cm. high; leaves rhombic-ovate to elliptic; sepals ovate, acuminate, scarious-margined; corolla light blue, 10 mm. long**53. P. brevifolius.**

Plants more or less puberulent or glandular.

Sepals 4 to 5 mm. long.

Corolla ventricose-funnelform, 15 to 18 mm. long, purplish blue. Leaves ovate-spatulate to lanceolate; stems grayish puberulent; sepals linear-oblong, glandular-hirsute.
36. P. moffatti.

Corolla blue, tubular or tubular-funnelform.

Basal leaves oblanceolate; corolla nearly tubular, 15 mm. long**51. P. radicosus.**

Basal leaves oval or ovate; corolla tubular-funnelform, 12 mm. long.
52. P. humilis.

1. Pentstemon bridgesii A. Gray, Proc. Amer. Acad. **7**: 379. 1868.

Rocky canyons and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Colorado and New Mexico, westward to Nevada and California.

1a. Pentstemon bridgesii amplexicaulis Monnet, Bull. Soc. Bot. France **61**: 228. 1915.

Gravelly washes of the artemisia and pinyon belts. Nevada.

2. Pentstemon gracilentus A. Gray, U. S. Rep. Expl. Miss. Pacif. **6**: 82. 1857.

Canyons and on mountain sides of the yellow pine, aspen, and spruce belts. Oregon, northern California, and Nevada.

3. Pentstemon roezli Regel, Gartenflora **1872**: 239. 1872.

Pentstemon roezli violaceus T. S. Brandeg. Bot. Gaz. **27**: 456. 1899.

Artemisia, yellow pine, and aspen belts. Oregon, California, and western Nevada.

4. Pentstemon cinerascens Greene, Leaflets **1**: 161. 1906.

Yellow pine belt. Western Nevada.

5. Pentstemon sepalulus A. Nels. in Coulter, New Man. Rocky Mount. 449. 1909.

Canyons and mountain sides of the pinyon, yellow pine, and aspen belts. Utah.

6. Pentstemon platyphyllus Rydb. Bull. Torrey Club **36**: 690. 1909.

Canyons and mountain sides of the artemisia, pinyon, yellow pine, and aspen belts. Utah.

7. Pentstemon leonardi Rydb. Bull. Torrey Club **40**: 483. 1913.
Yellow pine, aspen, and spruce belts. Utah.

8. Pentstemon kingii S. Wats. in King, Geol. Expl. 40th Par. **5**: 222. 1871.
Pinyon, yellow pine, and aspen belts. Utah and Nevada.

9. Pentstemon davidsonii Greene, Pittonia **2**: 241. 1892.
Spruce belt. Washington to California and western Nevada.

10. Pentstemon newberryi A. Gray, U. S. Rep. Expl. Miss. Pacif. **6**: 82. *pl. 14*. 1857.

Rocky places on mountain sides of the yellow pine, aspen, and spruce belts. California and western Nevada.

11. Pentstemon montanus Greene, Pittonia **2**: 240. 1892.
Spruce belt. Montana to Utah and Idaho.

12. Pentstemon breviflorus Lindl. Bot. Reg. **23**: *pl. 1946*. 1837.

Foothills and dry canyons of the yellow pine belt. California and western Nevada.

13. Pentstemon rothrockii A. Gray, Syn. Fl. **2**[1]: 260. 1878.
Pentstemon shockleyi S. Wats. Proc. Amer. Acad. **23**: 265. 1888.
Aspen and spruce belts. California and western Nevada.

14. Pentstemon lemmoni A. Gray in Brewer & Wats. Bot. Calif. **1**: 557. 1876.
Rocky hillsides and canyons of the yellow pine belt. Northern California and western Nevada.

15. Pentstemon eatoni A. Gray, Proc. Amer. Acad. **8**: 395. 1872.
Canyons and mountain sides of the artemisia belt, upward to 3,000 meters. Utah to northwestern New Mexico, westward to Nevada.

15a. Pentstemon eatoni undosus Jones, Proc. Calif. Acad. II. **5**: 715. 1895.
Plains, canyons, and hillsides of the upper Covillea, artemisia, and pinyon belts. Utah and Arizona.

16. Pentstemon torreyi Benth. in DC. Prodr. **10**: 324. 1846.
Artemisia belt, upward to the aspen and spruce belts. Colorado and eastern Utah, southward to Mexico.

17. Pentstemon trichander (A. Gray) Rydb. Bull. Torrey Club **33**: 151. 1906.
Pentstemon barbatus trichander A. Gray, Proc. Amer. Acad. **11**: 94. 1876.
Dry hillsides and canyons, upward to 2,700 meters. Colorado and New Mexico to eastern Utah (?) and Arizona.

18. Pentstemon barbatus (Cav.) Roth, Catal. Bot. **3**: 49. 1806.
Chelone barbata Cav. Icon. Pl. **3**: 22. *pl. 242*. 1794.
Foothills and dry canyons of the pinyon, yellow pine, and aspen belts. Colorado to Nevada, southward to Mexico.

18a. Pentstemon barbatus puberulus A. Gray. in Torr. U. S. & Mex. Bound. Bot. 114. 1859.
In canyons; Guadalupe Canyon, Arizona. Arizona and southern Utah(?).

19. Pentstemon utahensis Eastw. Zoe **4**: 124. 1893.
Pentstemon confusus Jones, Zoe **4**: 280. 1893.
Plains and dry hillsides of the artemisia and pinyon belts. Southern Utah, Arizona, and Nevada.

20. Pentstemon fremontii Torr. & Gray; A. Gray, Proc. Amer. Acad. **6:** 60. 1862.

Pentstemon leptanthus Pennell, Contr. U. S. Nat. Herb. **20:** 339. 1920.

Plains and dry hillsides of the artemisia and pinyon belts. Wyoming, Colorado, and Utah.

21. Pentstemon jonesii Pennell, Contr. U. S. Nat. Herb. **20:** 338. 1920.

Valleys and hillsides of the artemisia belt. Southwestern Utah.

22. Pentstemon strictus Benth. in DC. Prodr. **10:** 324. 1846.

Pentstemon strictus angustus Pennell, Contr. U. S. Nat. Herb. **20:** 356. 1920.

Mountain sides and canyons of the artemisia belt, upward to 3,000 meters. Wyoming to New Mexico and Utah.

23. Pentstemon comarrhenus A. Gray, Proc. Amer. Acad. **12:** 81. 1876.

Canyons and mountain sides of the artemisia belt, upward to 3,000 meters. Colorado, New Mexico, and Utah. Perhaps only a form of the preceding species.

24. Pentstemon strictiformis Rydb. Bull. Torrey Club **31:** 642. 1905.

Pentstemon scariosus Pennell, Contr. U. S. Nat. Herb. **20:** 353. 1920.

Mountain parks of the pinyon, yellow pine, and aspen belts. Colorado and New Mexico to central Utah.

25. Pentstemon garrettii Pennell, Contr. U. S. Nat. Herb. **20:** 353. 1920.

Pinyon, yellow pine, and aspen belts. Northern Utah.

26. Pentstemon cyanocaulis Payson, Bot. Gaz. **60:** 380. 1915.

Rocky places of the artemisia and pinyon belts. Western Colorado and eastern Utah.

27. Pentstemon cyananthus Hook. in Curtis's Bot. Mag. **75:** *pl. 4464.* 1849.

Pentstemon cyananthus longiflorus Pennell, Contr. U. S. Nat. Herb. **20:** 353. 1920.

Canyons and mountain sides of the artemisia belt, upward to 3,000 meters. Wyoming and Idaho to Utah.

27a. Pentstemon cyananthus subglaber (A. Gray) Pennell, Contr. U. S. Nat. Herb. **20:** 352. 1920.

Pentstemon fremontii subglaber A. Gray, Syn. Fl. **2**[1]**:** 262. 1878.

Canyons and hillsides of the artemisia and pinyon belts. Idaho and Utah.

28. Pentstemon kennedyi A. Nels. Proc. Biol. Soc. Washington **17:** 97. 1904.

Canyons and mountain sides of the artemisia belt, upward to 3,000 meters. Nevada.

29. Pentstemon speciosus Dougl. in Lindl. Bot. Reg. **15:** *pl. 1270.* 1829.

Pentstemon rex Nels. & Macbr. Bot. Gaz. **55:** 381. 1913.

Pentstemon laevis Pennell, Contr. U. S. Nat. Herb. **20:** 347. 1920.

Valleys and mountain sides of the artemisia belt, upward to 3,000 meters. Washington to California and Utah.

30. Pentstemon subglaber Rydb. Bull. Torrey Club **36:** 688. 1909.

Pentstemon leiophyllus Pennell, Contr. U. S. Nat. Herb. **20:** 346. 1920.

Foothills, canyons, and mountain sides of the artemisia belt, upward to 3,000 meters. Wyoming and Idaho to Colorado and Utah.

31. Pentstemon uintahensis Pennell, Contr. U. S. Nat. Herb. **20:** 350. 1920.

Alpine belt. Utah.

32. Pentstemon wardii A. Gray, Proc. Amer. Acad. **12**: 82. 1876.
Dry canyons of the pinyon and yellow pine belts. Utah and Nevada.

33. Pentstemon tidestromii Pennell, Contr. U. S. Nat. Herb. **20**: 379. 1920.
Pinyon belt. Central Utah.

34. Pentstemon parvus Pennell, Contr. U. S. Nat. Herb. **20**: 345. 1920.
Alpine belt; Aquarius Plateau, Utah.

35. Pentstemon dolius Jones; Pennell, Contr. U. S. Nat. Herb. **20**: 341. 1920.
Slopes of the artemisia and pinyon belts. Utah.

36. Pentstemon moffatti Eastw. Zoe **4**: 9. 1893.
Pentstemon pseudohumilis Jones, Contr. West. Bot. **12**: 65. 1908.
Plains and desert areas. Western Colorado and eastern Utah.

37. Pentstemon ophianthus Pennell, Contr. U. S. Nat. Herb. **20**: 343. 1920.
Mesas and slopes of the artemisia and pinyon belts. Colorado and Utah.

38. Pentstemon petiolatus T. S. Brandeg. Bot. Gaz. **27**: 455. 1899.
Pentstemon calcareus Jones, Contr. West. Bot. **11**: 60. 1908.
Mountain sides and rocky canyons of the artemisia and pinyon belts. Southern Nevada and southwestern Utah.

39. Pentstemon albomarginatus Jones, Contr. West. Bot. **12**: 61. 1908.
Mesas in drifting sand of the Covillea and artemisia belts. Arizona and Nevada.

40. Pentstemon palmeri A. Gray, Proc. Amer. Acad. **7**: 379. 1868.
Foothills and canyons of the upper Covillea, artemisia, and pinyon belts. Southern Utah and Arizona, westward to California.

41. Pentstemon macranthus Eastw. Bull. Torrey Club **32**: 207. 1905.
Foothills and canyons of the artemisia and pinyon belts. Nevada.

42. Pentstemon spectabilis Thurb.; Torr. & Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 119. 1857.
Dry hillsides and canyons of the Covillea, artemisia, and pinyon belts. New Mexico to southern Nevada and California.

43. Pentstemon floridus T. S. Brandeg. Bot. Gaz. **27**: 454. 1899.
Upper Covillea and lower artemisia belts. Southern Nevada.

44. Pentstemon acuminatus Dougl.; Lindl. Bot. Reg. **15**: *pl. 1285.* 1829.
Plains and hillsides. Alberta to Washington, Idaho, and northern Nevada(?).

45. Pentstemon pachyphyllus A. Gray; Rydb. Fl. Rocky Mount. 770, 1066. 1917.
Pentstemon lentus Pennell, Contr. U. S. Nat. Herb. **20**: 359. 1920.
Slopes of the artemisia, pinyon, and yellow pine belts. Colorado and Utah.

46. Pentstemon chionophilus Greene, Leaflets **1**: 161. 1906.
Pentstemon modestus Greene, Leaflets **1**: 165. 1906.
Aspen and spruce belts. Nevada and Oregon.

47. Pentstemon procerus Dougl.; Graham, Edinburgh New Phil. Journ. **7**: 348. 1829.
Pentstemon confertus aberrans Jones, Proc. Calif. Acad. II. **5**: 715. 1895.
Aspen, spruce, and alpine belts. Saskatchewan to Alaska, southward to Colorado and California. This species forms large dense colonies in the mountain parks.

48. Pentstemon rydbergii A. Nels. Bull. Torrey Club **25:** 281. 1898.
Pentstemon aggregatus Pennell. Contr. U. S. Nat. Herb. **20:** 367. 1920.
Aspen and spruce belts. Wyoming and Colorado, westward to Idaho and Nevada.

49. Pentstemon washoensis Greene, Leaflets **1:** 163. 1906.
Pentstemon pratensis Greene, Leaflets **1:** 165. 1906.
Meadows and slopes of the artemisia, pinyon, and yellow pine belts. Nevada to Oregon.

50. Pentstemon oreganus (A. Gray) Howell, Fl. Northw. Amer. 515. 1901.
Pentstemon gairdnerii oreganus A. Gray, Syn. Fl. ed. 2. **2**[1]**:** 441. 1886.
Lava fields, southeastern Oregon. Oregon, Idaho, and northern Nevada(?).

51. Pentstemon radicosus A. Nels. Bull. Torrey Club **25:** 280. 1898.
Plains and mountain sides, upward to the aspen belt. Montana to Colorado, Utah, and Nevada.

52. Pentstemon humilis Nutt.; A. Gray, Proc. Amer. Acad. **6:** 69. 1862.
Plains, mountain sides, and canyons, upward to the spruce belt. Wyoming to Utah, Nevada, and British Columbia.

53. Pentstemon brevifolius (A. Gray) A. Nels. in Coulter, New Man. Rocky Mount. 445. 1909.
Pentstemon humilis brevifolius A. Gray, Syn. Fl. **2**[1]**:** 267. 1878.
Aspen, spruce, and subalpine belts. Utah and Nevada.

54. Pentstemon watsoni A. Gray, Syn. Fl. **2**[1]**:** 267. 1878.
Pentstemon phlogifolius Greene, Leaflets **1:** 164. 1906.
Sagebrush areas, mountain sides, and dry canyons, upward to the aspen belt. Colorado to Nevada and Idaho.

55. Pentstemon whippleanus A. Gray, Proc. Amer. Acad. **6:** 73. 1862.
Spruce and alpine belts. Wyoming to New Mexico, Utah, and Arizona.

56. Pentstemon deustus Dougl.; Lindl. Bot. Reg. **16:** *pl. 1318.* 1830.
Plains, foothills, and canyons of the artemisia and pinyon belts. Montana and Wyoming to Nevada, California, and British Columbia.

56a. Pentstemon deustus pedicellatus Jones, Zoe **4:** 281. 1893.
Gravelly slopes, among junipers and pinyons, at 2,400 meters. Nevada.

57. Pentstemon heterodoxus A. Gray, Syn. Fl. **2**[1]**:** 269. 1878.
Spruce belt; Sierra Nevada. California and western Nevada.

58. Pentstemon incanus (A. Gray) Tidestrom.
Pentstemon pumilus incanus A. Gray, Syn. Fl. **2**[1]**:** 269. 1878.
Dry canyons and hillsides. Southern Utah to Arizona, Nevada, and southern California.

59. Pentstemon thompsoniae (A. Gray) Rydb. Bull. Torrey Club **36:** 690. 1909.
Pentstemon pumilus thompsoniae A. Gray, Syn. Fl. **2**[1]**:** 269. 1878.
Rocky canyons, upward to 2,400 meters. Southern Utah and Arizona.

60. Pentstemon caespitosus Nutt.; A. Gray, Proc. Amer. Acad. **6:** 66. 1862.
Pentstemon caespitosus perbrevis Pennell, Contr. U. S. Nat. Herb. **20:** 375. 1920.
Dry canyons and mountain sides, upward to 2,100 meters or more. Colorado, Wyoming, and Utah.

61. Pentstemon suffrutescens Rydb. Bull. Torrey Club **28:** 503. 1901.

Canyons and mountain sides, upward to 2,400 meters. Western Colorado and Utah.

62. Pentstemon coloradensis A. Nels. Bull. Torrey Club **26:** 355. 1899.

Pentstemon linarioides sileri A. Gray, Syn. Fl. **2**[1]: 270. 1878.

Plains and hillsides of the artemisia and pinyon belts. Southern Colorado and Utah.

63. Pentstemon abietinus Pennell, Contr. U. S. Nat. Herb. **20:** 376. 1920.

Aspen belt. Utah.

64. Pentstemon ambiguus Torr. Ann. Lyc. N. Y. **2:** 288. 1828.

Plains and canyons of upper Covillea and artemisia belts. Kansas to Texas, Nevada, and southern California.

65. Pentstemon thurberi Torr. U. S. Rep. Expl. Miss. Pacif. **7:** 15. 1857.

Plains and canyons of the Covillea and artemisia belts. New Mexico to southern Utah (?), southward to Mexico. Perhaps beyond our limits.

8. CHIONOPHILA Benth.

1. Chionophila jamesii Benth. in DC. Prodr. **10:** 331. 1846.

Alpine belt; southwestern Colorado and perhaps in the Uintahs. Wyoming and Colorado.

9. MIMULUS L. Monkeyflower

Corolla yellow.

Plants scapose or nearly so, 15 cm. high or less. Leaves obovate to oblanceolate, 2 cm. long or less, entire or serrulate; calyx narrow; corolla 15 to 20 mm. long.

Leaves glabrous or sparingly villous above_____**15. M. primuloides.**

Leaves villous above, very small, round-obovate_____**16. M. pilosellus.**

Plants with leafy stems.

Calyx symmetric or nearly so, the teeth nearly equal.

Calyx 7 mm. long or less, reddish; leaves linear to oblanceolate, 15 mm. long or less.

Corolla 4 to 8 mm. long; plant about 10 cm. high.__**11. M. suksdorfii.**

Corolla 10 to 15 mm. long; plant 6 cm. high or less.

12. M. montioides.

Calyx 8 mm. long or more; leaves ovate or broader. Plants viscid-villous, 5 to 40 cm. high.

Corolla 20 mm. long or more; calyx teeth lanceolate.

13. M. moschatus.

Corolla 15 mm. long or less; calyx teeth triangular.

14. M. floribundus.

Calyx oblique, the teeth very unequal.

Calyx in flower 6 mm. long or less. Corolla 8 to 14 mm. long; leaves roundish, denticulate or entire; glabrous annual with very slender stems_____**8. M. microphyllus.**

Calyx in flower 7 mm. long or more.

Leaves oblong or oblanceolate, more or less distinctly pinnate-veined.

Plant glandular, 5 to 10 cm. high; corolla yellow or pink, 15 to 20 mm. long; leaves about 12 mm. long_____**17. M. parryi.**

Plant villous, 10 to 40 cm. high; corolla about 10 mm. long; leaves 10 to 40 mm. long_____**24. M. pilosus.**

Leaves ovate or broader, more or less distinctly palmate-veined.
Plants 10 cm. high or less, more or less densely matted. Corolla 20 to 30 mm. long; calyx asymmetrical, purple-dotted.
7. M. implexus.
Plants 20 cm. high or more.
Corolla 10 mm. long. Leaves rounded, cordate, unequally toothed or lobed, the lowest lyrate-pinnatifid_____**6. M. micranthus.**
Corolla 15 mm. long or more.
Stems stout, 20 to 60 cm. high; leaves orbicular to ovate, irregularly toothed, glabrous or nearly so; corolla 20 to 30 mm. long_____**4. M. guttatus.**
Stems slender; leaves ovate, acute or obtuse, sparsely serrate; calyx purple-dotted; corolla 15 to 20 mm. long.
5. M. corallinus.
Corolla purple, red, or rose-colored (occasionally yellow in no. 17).
Calyx decidedly oblique at orifice, the teeth very unequal. Corolla pink or crimson, rarely yellow; plants 3 to 10 cm. high.
Leaves reddish, oblanceolate; throat of corolla nearly cylindric; plant viscidulous-pubescent_____**19. M. mohavensis.**
Leaves green, oblong or oblanceolate; throat of corolla funnelform; plants glandular.
Calyx teeth acute; leaves about 12 mm. long_____**17. M. parryi.**
Calyx teeth broad, obtuse; leaves often 25 mm. long__**18. M. torreyi.**
Calyx symmetric or nearly so, the teeth often nearly equal.
Corolla 6 to 12 mm. long.
Leaves linear, at least the upper ones. Calyx teeth triangular-lanceolate; plants 10 cm. high or less_____**10. M. breweri.**
Leaves spatulate-oblong or lanceolate. Plants glandular-puberulent to glabrate.
Calyx about 5 mm. long, glandular_____**23. M. leptaleus.**
Calyx about 7 mm. long, sparingly if at all glandular__**9. M. rubellus.**
Corolla 15 mm. long or more.
Corolla 15 to 25 mm. long, salverform.
Plant viscid-pubescent, robust, often 30 cm. high. Leaves broadly ovate, abruptly acuminate, 3 or 5-ribbed_____**20. M. cusickii.**
Plants glandular-pubescent or pilose, 20 cm. high or less.
Leaves (upper ones) oblong to ovate, often 3 to 4 cm. long; corolla crimson, with yellow center, the rotate limb 15 mm. broad or more_____**21. M. bigelovii.**
Leaves obovate, oblong, or lanceolate, 2 cm. long or less; corolla rose-purple or yellowish, the rotate limb rarely over 10 mm. broad_____**22. M. nanus.**
Corolla 30 to 50 mm. long. Perennials, 20 to 130 cm. high.
Stamens exserted; plants minutely and sparingly pubescent or often glabrate; leaves ovate-oblong to lanceolate, denticulate.
3. M. lewisii.
Stamens included; plants viscid or villous; leaves coarsely dentate.
Plant 60 to 130 cm. high; leaves ovate to obovate-lanceolate, 2 to 13 cm. long, the upper connate_____**1. M. cardinalis.**
Plant 10 to 30 cm. high; leaves cuneate-obovate to broadly oblanceolate, 2 to 5 cm. long_____**2. M. eastwoodiae.**

1. **Mimulus cardinalis** Dougl.; Benth. Scroph. Ind. 28. 1835.
Valleys of the artemisia belt. Oregon and California to western New Mexico and Mexico.

2. **Mimulus eastwoodiae** Rydb. Bull. Torrey Club **40**: 483. 1913.
Crevices of rocks; San Juan River, Utah.

3. **Mimulus lewisii** Pursh, Fl. Amer. Sept. 427. *pl. 20*. 1814.
Yellow pine, aspen, and spruce belts. Minnesota to British Columbia, southward to Colorado, Arizona, and California.

4. **Mimulus guttatus** DC. Cat. Hort. Monsp. 127. 1813.
Mimulus langsdorfii Don in Curtis's Bot. Mag. **36**: *pl. 1501*. 1812, as synonym.
Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to Alaska, southward to New Mexico and California.

5. **Mimulus corallinus** Greene, Erythea **4**: 21. 1896.
Yellow pine and aspen belts. California and western Nevada.

6. **Mimulus micranthus** Heller, Muhlenbergia **8**: 132. 1912.
Yellow pine belt. California and Nevada.

7. **Mimulus implexus** Greene, Journ. Bot. Brit. & For. **33**: 8. 1895.
Aspen, spruce, and alpine belts. British Columbia to California and Nevada.

8. **Mimulus microphyllus** Benth. in DC. Prodr. **10**: 371. 1846.
Yellow pine and aspen belts. Washington to California and Nevada.

9. **Mimulus rubellus** A. Gray in Torr. U. S. & Mex. Bound. Bot. 116. 1859.
Covillea, artemisia, pinyon, and yellow pine belts. New Mexico to southern California, northward to Idaho and Washington.

10. **Mimulus breweri** (Greene) Coville, Contr. U. S. Nat. Herb. **4**: 171. 1893.
Eunanus breweri Greene, Bull. Calif. Acad. **1**: 101. 1885.
Yellow pine, aspen, and spruce belts. British Columbia to California and Nevada.

11. **Mimulus suksdorfii** A. Gray, Syn. Fl. ed. 2. **2**^{1}: 450. 1886.
Yellow pine belt. British Columbia to California, eastward to Colorado and Arizona.

12. **Mimulus montioides** A. Gray, Proc. Amer. Acad. **7**: 380. 1868.
Valleys and canyons of the artemisia, pinyon, and yellow pine belts. California and western Nevada.

13. **Mimulus moschatus** Dougl.; Lindl. Bot. Reg. **13**: *pl. 1118*. 1827.
Aspen and spruce belts. Ontario to British Columbia, southward to Colorado and California.

14. **Mimulus floribundus** Dougl.; Lindl. Bot. Reg. **13**: *pl. 1125*. 1827.
Wet places of the artemisia belt, upward to the spruce belt. Montana to British Columbia, southward to New Mexico, Arizona, and California.

15. **Mimulus primuloides** Benth. Scroph. Ind. 29. 1835.
Yellow pine, aspen, and spruce belts. Washington and Idaho, southward to California and Nevada.

16. **Mimulus pilosellus** Greene, Erythea **4**: 22. 1896.
Mountain meadows; Sierra Nevada. California and western Nevada. Perhaps only a form of the preceding species.

17. **Mimulus parryi** A. Gray, Proc. Amer. Acad. **11**: 97. 1876.
Covillea and artemisia belts. Southern Utah and Arizona.

18. Mimulus torreyi A. Gray, Proc. Amer. Acad. **11**: 97. 1876.
Yellow pine and aspen belts. California and western Nevada (?).

19. Mimulus mohavensis Lemmon, Bot. Gaz. **9**: 142. 1884.
Desert areas; Mohave Desert. Southern California.

20. Mimulus cusickii (Greene) Piper, Contr. U. S. Nat. Herb. **11**: 508. 1906.
Mimulus bigelovii ovatus A. Gray, Syn. Fl. ed. 2. **2**^{1}: 444. 1886.
Eunanus cusickii Greene, Pittonia **1**: 36. 1887.
Artemisia and pinyon belts. California and Nevada to Washington.

21. Mimulus bigelovii A. Gray, Bot. Calif. **1**: 564. 1876.
Covillea and artemisia belts. Southern California to southern Utah.

22. Mimulus nanus Hook & Arn. Bot. Beechey Voy. 378. 1840.
Artemisia, pinyon, and yellow pine belts. Montana to Washington, southward to Wyoming and Nevada.

23. Mimulus leptaleus A. Gray, Proc. Amer. Acad. **11**: 96. 1876.
Yellow pine, aspen, and spruce belts. California and western Nevada (?).

24. Mimulus pilosus (Benth.) S. Wats. in King, Geol. Expl. 40th Par. **5**: 225. 1871.
Herpestis pilosa Benth. Comp. Bot. Mag. Hook. **2**: 57. 1836.
Artemisia belt. Washington to California and Arizona.

10. GRATIOLA L. Hedge-hyssop

1. Gratiola neglecta Torr. Cat. Pl. N. Y. 10, 89. 1819.
Wet places of the artemisia, pinyon, and yellow pine belts; Idaho. Maine to Florida, westward to British Columbia and California.

11. MONNIERA P. Br.

1. Monniera rotundifolia Michx. Fl. Bor. Amer. **2**: 22. 1803.
Wet places; Fallon, Nevada. Illinois to Virginia, westward to Montana, Nevada, and Texas.

12. LIMOSELLA L. Mudweed

Leaves elliptic, spatulate, or oblanceolate, long-petioled, obtuse. **1. L. aquatica.**
Leaves subulate to linear-filiform **2. L. tenuifolia.**

1. Limosella aquatica L. Sp. Pl. 631. 1753.
Wet places in the artemisia belt, upward to the spruce belt. Labrador to British Columbia, southward to New Mexico and California; also in Europe and Asia.

2. Limosella tenuifolia Hoffm. Deutschl. Fl. 29. 1804.
Wet places in the artemisia belt, upward to the spruce belt. Labrador to British Columbia, southward to New Mexico and California; also in South America, Europe, and Asia.

13. ILYSANTHES Raf.

1. Ilysanthes dubia (L.) Barnhart, Bull. Torrey Club **26**: 376. 1899.
Gratiola dubia L. Sp. Pl. 17. 1753.
Wet places and along shores, upward to the yellow pine belt; California. Washington to California, eastward to Texas and Florida; also in eastern Asia and South America.

14. VERONICA L. SPEEDWELL

Flowers in axillary racemes.
  Leaves with short petioles, the blades ovate to lance-oblong, entire, serrate, or crenate. Corolla blue or white; capsule broader than long, emarginate----------1. V. americana.
  Leaves sessile, lanceolate to linear, entire to serrulate or denticulate.
    Leaves broadly lanceolate; pedicels rarely over 7 mm. long.
      2. V. anagallis-aquatica.
    Leaves linear-lanceolate to linear; pedicels filiform, 10 mm. long or more----------3. V. scutellata.
Flowers in terminal racemes, or axillary and solitary.
  Flowers in terminal racemes; perennials.
    Leaves, at least the lower ones, petioled, the blades oblong to suborbicular, entire or crenulate. Corolla white or purplish, small; capsule retuse, puberulent----------4. V. serpyllifolia.
    Leaves all sessile; corolla blue or violet.
      Corolla 4 to 5 mm. broad; capsule emarginate; leaves elliptic or ovate, entire or crenulate----------5. V. wormskjoldii.
      Corolla 8 to 10 mm. broad; capsule obcordate; leaves oval or oblong, entire or nearly so----------6. V. cusickii.
  Flowers solitary and axillary, the subtending leaves scarcely reduced; annuals.
    Peduncles shorter than the leaves.
      Leaves oblong to linear, entire to crenulate; capsule emarginate.
        7. V. peregrina.
      Leaves ovate, crenate; capsule obcordate----------8. V. arvensis.
    Peduncles equaling or exceeding the leaves.
      Leaf blades orbicular or reniform, entire or 3 or 5-lobed. Plant diffusely branched, sparingly villous----------12. V. hederaefolia.
      Leaf blades mostly oblong or ovate, crenate.
        Corolla 9 mm. broad or more. Capsule with an open sinus; leaves ovate to suborbicular, coarsely serrate----------9. V. tournefortii.
        Corolla 6 mm. broad or less.
          Leaves ovate or oval, crenate; capsule emarginate; stems decumbent or creeping----------10. V. agrestis.
          Leaves mostly oblong, entire or toothed; capsule deeply cleft; stems erect or ascending----------11. V. biloba.

1. Veronica americana Schwein.; Benth. in DC. Prodr. **10**: 468. 1846.

Wet places of the artemisia belt, upward to the subalpine belt. Newfoundland to Alaska, southward to Virginia, New Mexico, and California.

2. Veronica anagallis-aquatica L. Sp. Pl. 12. 1753.

Wet places of the Covillea belt, upward to the yellow pine belt. Nova Scotia to British Columbia, southward to North Carolina and Arizona.

3. Veronica scutellata L. Sp. Pl. 12. 1753.

Artemisia, pinyon, and yellow pine belts; California. Newfoundland to Yukon, southward to New York, Colorado, and California.

4. Veronica serpyllifolia L. Sp. Pl. 12. 1753.

Yellow pine, aspen, spruce, and alpine belts. Labrador to Alaska, southward to Georgia, New Mexico, and California.

5. Veronica wormskjoldii Roem. & Schult. Syst. Veg. **1**: 101. 1817.

Aspen, spruce, and subalpine belts. Greenland to Alaska, southward to New Hampshire, New Mexico, and Arizona.

6. Veronica cusickii A. Gray, Syn. Fl. **2**[1]: 288. 1878.

Yellow pine, aspen, spruce, and subalpine belts. Idaho and Washington to northern California. Perhaps outside our range.

7. Veronica peregrina L. Sp. Pl. 14. 1753.

Covillea, artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, southward to Texas and Mexico.

8. Veronica arvensis L. Sp. Pl. 13. 1753.

Fields and waste places; introduced from Europe. Canada and the United States.

9. Veronica tournefortii K. Gmel. Fl. Badens. **1**: 39. 1805.

Fields and waste places; introduced from Europe. New York to Georgia, westward to Utah.

10. Veronica agrestis L. Sp. Pl. 13. 1753.

Fields and waste places; introduced from Europe. Nova Scotia to New Jersey, westward to Louisiana and Utah (according to Rydberg).

11. Veronica biloba L. Mant. Pl. **2**: 172. 1771.

Alfalfa fields, Utah (according to Rydberg). Introduced from Asia Minor.

12. Veronica hederaefolia L. Sp. Pl. 13. 1753.

Fields and waste places; introduced from Europe. New York to South Carolina and Utah (according to Rydberg).

15. SYNTHYRIS Benth.

Leaves twice or thrice pinnatifid, the ultimate lobes linear or lanceolate.
Corolla white or pink, small; plant villous, 10 to 20 cm. high. **1. S. pinnatifida.**

Leaves simple, deeply cleft to crenate.
Leaf blades reniform or rounded, with cordate base, laciniately cleft.
Corolla small, violet, blue, or whitish; plant 15 cm. high or less, glabrous or slightly villous **2. S. laciniata.**
Leaf blades oblong to ovate, mostly crenate.
Calyx lobes villous-ciliate, oblong. Corolla purplish, the lower lip 2 or 3-lobed; leaves lance-oblong to elliptic; plants 10 to 30 cm. high, more or less tomentose **3. S. plantaginea.**
Calyx villous. Plants 15 cm. high or less, villous to glabrate.
Corolla present, 7 to 8 mm. long, violet-purple, the lower lip 2 or 3-parted; leaf blades ovate or elliptic, often subcordate, crenate, glabrous in age **4. S. alpina.**
Corolla wanting; leaf-blades oblong to ovate **5. S. gymnocarpa.**

1. Synthyris pinnatifida S. Wats. in King, Geol. Expl. 40th Par. **5**: 227. *pl.* **22**, *f.* *1–2*. 1871.

Yellow pine, aspen, and spruce belts. Utah and Idaho.

2. Synthyris laciniata (A. Gray) Rydb. Mem. N. Y. Bot. Gard. **1**: 353. 1900.
Synthyris pinnatifida laciniata A. Gray, Syn. Fl. **2**[1]: 286. 1878.

Aspen, spruce, and subalpine belts. Montana to Utah.

3. Synthyris plantaginea Benth. in DC. Prodr. **10**: 455. 1846.

Yellow pine, aspen, spruce, and alpine belts. Wyoming to New Mexico and Arizona.

4. Synthyris alpina A. Gray, Amer. Journ. Sci. II. **34**: 251. 1862.

Spruce and alpine belts. Wyoming to New Mexico and eastern Utah.

5. Synthyris gymnocarpa (A. Nels.) Heller, Muhlenbergia **1**: 5. 1900.
Wulfenia gymnocarpa A. Nels. Bull. Torrey Club **25**: 282. 1898.

Yellow pine, aspen, spruce, and subalpine belts. Alberta southward to Nebraska, Colorado, and Utah.

16. DIGITALIS L. Foxglove

1. Digitalis purpurea L. Sp. Pl. 621. 1753.

Escaped from cultivation in the Eastern States and also from Washington to California.

17. CASTILLEJA Mutis. Painted-cup

Plants annual, 20 to 40 cm. high, glandular-pubescent. Bracts linear or linear-lanceolate, attenuate, scarlet or red.
Upper leaves and bracts linear; corolla exserted_____**1. C. minor.**
Upper leaves and bracts lanceolate; corolla equaling the calyx__**2. C. exilis.**
Plants perennial.
Bracts entire, or if 3-lobed, the middle lobe broad and rounded.
Bracts yellow to white or brownish, puberulent.
Corolla about 3 cm. long, the galea 10 mm. long or more. Stem puberulent below, villous above; leaves entire, linear-lanceolate.
8. C. brunnescens.
Corolla 25 mm. long or less. Plants puberulent.
Galea 6 to 7 mm. long. Leaves linear to lanceolate, 1 or 3-ribbed; inflorescence narrow, dense_____**22. C. luteovirens.**
Galea 8 to 10 mm. long or more.
Leaves linear to linear-lanceolate; plant 15 to 40 cm. high, puberulent, villous above; corolla brownish or greenish purple; bracts more or less villous_____**20. C. occidentalis.**
Leaves lanceolate to ovate-oblong; plant 30 to 50 cm. high, puberulent; corolla greenish; bracts puberulent__**21. C. sulphurea.**
Bracts red or reddish.
Corolla 30 mm. long or more.
Plant (at least the stem) canescent-tomentose. Leaves entire, linear; galea 10 to 15 mm. long_____**5. C. integra.**
Plants pubescent to glabrate, the inflorescence often villous.
Leaves linear-lanceolate to lanceolate, acute or acuminate; galea 13 to 14 mm. long_____**6. C. confusa.**
Leaves oblong-lanceolate to ovate, acute or blunt; galea about 10 mm. long_____**7. C. rhexifolia.**
Corolla 25 mm. long or less.
Stem and leaves glabrous (at least below). Leaves linear-lanceolate to lanceolate; inflorescence short and dense, puberulent; bracts crimson, villous-ciliate; galea 7 to 8 mm. long_____**9. C. lauta.**
Stem and leaves puberulent to villous.
Leaves lance-oblong to ovate. Corolla greenish, with crimson or purple margins; bracts tipped with crimson; plant viscid-villous to puberulent.
Corolla about 20 mm. long_____**11. C. leonardi.**
Corolla about 15 mm. long_____**12. C. humilis.**
Leaves lanceolate to linear. Stems tufted, 20 cm. high or less.
Bracts puberulent, brownish crimson; corolla green, with purple margin, the galea about 7 mm. long_____**19. C. parvula.**
Bracts villous (at least on the margin), brownish crimson to greenish yellow; corolla brownish or greenish purple, the galea about 8 mm. long_____**20. C. occidentalis.**

Bracts narrow, mostly 3 or 5-lobed or cleft, with narrow segments.
Corolla 35 mm. long or more, long-exserted.
Leaves or leaf segments narrowly linear. Corolla greenish yellow, tinged with scarlet; plant glabrous to villous_____3. C. linariaefolia.
Leaves linear-lanceolate or lanceolate.
Leaves glabrous or nearly so; bracts crimson; corolla green, with purplish margin_____14. C. vreelandii.
Leaves pubescent; bracts yellowish or brick-red; corolla yellowish green, with scarlet or yellow margin_____13. C. variabilis.
Corolla 30 mm. long or less.
Bracts yellow or yellowish.
Plants puberulent to villous-hirsute; leaves linear, entire or dissected; inflorescence narrow; corolla 20 mm. long or more. 24. C. flava.
Plant soft-villous, branching; leaves 3 or 5-parted into linear lobes; inflorescence a narrow dense spike; corolla about 18 mm. long. 26. C. pilosa.

Bracts red or reddish.
Plants glabrous or nearly so up to the inflorescence.
Stem 30 cm. high or more, branching above. Leaves linear, rigid, 2 to 5 cm. long; corolla yellow, the galea 10 mm. long or less. 25. C. linoides.
Stems tufted or solitary and simple. Inflorescence short-villous; galea 12 to 15 mm. long.
Leaves narrowly linear, mostly 1-ribbed, entire or 3-lobed above. 4. C. arcuata.
Leaves broadly linear to lanceolate, 3-ribbed, entire, acuminate. 16. C. miniata.

Plants distinctly pubescent or glandular.
Corolla about 10 mm. long, the 3-lobed lip nearly equaling the tube.
Plant 5 to 15 cm. high, glandular-puberulent; inflorescence oblong; bracts greenish purple_____17. C. inconspicua.
Corolla 15 to 30 mm. long.
Plants not glandular. Galea 10 to 12 mm. long.
Bracts commonly 3-lobed, the lobes lanceolate; plant puberulent or glabrate, 20 to 50 cm. high. Leaves linear-lanceolate, often lobed_____15. C. tweedyi.
Bracts 3 or 5-cleft, the lobes linear to lanceolate; plant hirsute-villous and puberulent, 10 to 40 cm. high. 18. C. angustifolia.

Plants glandular.
Galea 10 mm. long or less; plant 10 to 30 cm. high; leaves linear to narrowly lanceolate, entire or 3-cleft; bracts tipped with reddish or white lobes_____23. C. viscidula.
Galea 15 mm. long or more; plant 30 to 50 cm. high; leaves linear-oblong, entire or nearly so; bracts rose or bright red. Inflorescence elongate, narrow_____10. C. pinetorum.

1. Castilleja minor A. Gray in Brewer & Wats. Bot. Calif. **1**: 573. 1876.

Artemisia, pinyon, and yellow pine belts. New Mexico to southern California, southward to Mexico.

2. Castilleja exilis A. Nels. Proc. Biol. Soc. Washington **17**: 100. 1904.

Artemisia belt, upward to the spruce belt. Montana to Colorado, westward to Washington and Nevada.

3. Castilleja linariaefolia Benth. in DC. Prodr. **10**: 532. 1846.

Pinyon, yellow pine, aspen, and spruce belts. British Columbia to California, eastward to Wyoming and New Mexico. This is the State flower of Wyoming.

4. Castilleja arcuata Rydb. Bull. Torrey Club **34**: 35. 1907.

Spruce and alpine belts. Utah.

5. Castilleja integra A. Gray in Torr. U. S. & Mex. Bound. Bot. 119. 1859.

Artemisia, pinyon, and yellow pine belts; Grand Canyon, Colorado, New Mexico, and Arizona, southward to Mexico.

6. Castilleja confusa Greene, Pittonia **4**: 1. 1899.

Yellow pine, aspen, spruce, and subalpine belts. Colorado, New Mexico, and eastern Utah.

7. Castilleja rhexifolia Rydb. Mem. N. Y. Bot. Gard. **1**: 356. 1900.

Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to Alaska, southward to Colorado and Utah.

8. Castilleja brunnescens Rydb. Bull. Torrey Club **31**: 643. 1905.

Yellow pine, aspen, spruce, and subalpine belts. Wyoming, Colorado, and Utah.

9. Castilleja lauta A. Nels. Bull. Torrey Club **27**: 269. 1900.

Yellow pine, aspen, spruce, and subalpine belts. Montana to northern New Mexico, Utah, and Oregon.

10. Castilleja pinetorum Fernald, Erythea **6**: 50. 1898.

Yellow pine, aspen, and spruce belts. Idaho and Oregon to Nevada and California.

11. Castilleja leonardi Rydb. Bull. Torrey Club **34**: 36. 1907.

Spruce and subalpine belts. Utah.

12. Castilleja humilis Rydb. Bull. Torrey Club **34**: 37. 1907.

Spruce and subalpine belts; Uintah Mountains (?). Wyoming and Utah (?).

13. Castilleja variabilis Rydb. Bull. Torrey Club **34**: 37. 1907.

Spruce and subalpine belts. Utah.

14. Castilleja vreelandii Rydb. Bull. Torrey Club **34**: 38. 1907.

Yellow pine belt. Montana to Washington, southward to Utah.

15. Castilleja tweedyi Rydb. Mem. N. Y. Bot. Gard. **1**: 358. 1900.

Yellow pine, aspen, and spruce belts. Montana to Washington, southward to Wyoming and Utah.

16. Castilleja miniata Dougl.; Hook. Fl. Bor. Amer. **2**: 106. 1838.

Castilleja lanceifolia Rydb. Mem. N. Y. Bot. Gard. **1**: 357. 1900.

Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to Alaska, southward to Colorado and California.

17. Castilleja inconspicua Nels. & Kennedy, Proc. Biol. Soc. Washington **19**: 38. 1906.

Spruce and subalpine belts. Nevada and California.

18. Castilleja angustifolia (Nutt.) Don, Hist. Dichl. Pl. **4**: 616. 1837.

Euchroma angustifolia Nutt. Journ. Acad. Phila. **7**: 46. 1834.

Castilleja hispida Benth.; Hook. Fl. Bor. Amer. **2**: 105. 1838.

Castilleja chromosa A. Nels. Bull. Torrey Club **26**: 245. 1899.

Yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to Colorado and California.

19. Castilleja parvula Rydb. Bull. Torrey Club **34:** 40. 1907.
Spruce and subalpine belts. Utah.

20. Castilleja occidentalis Torr. Ann. Lyc. N. Y. **2:** 230. 1828.
Alpine belts. Alberta and British Columbia, southward to Colorado and Utah.

21. Castilleja sulphurea Rydb. Mem. N. Y. Bot. Gard. **1:** 359. 1900.
Yellow pine, aspen, and spruce belts. South Dakota and Montana to Colorado and Utah.

22. Castilleja luteovirens Rydb. Bull. Torrey Club **28:** 26. 1901.
? Castilleja wyomingensis Rydb. Bull. Torrey Club **28:** 502. 1901.
Yellow pine, aspen, and spruce belts. Wyoming, Colorado, and Utah.

23. Castilleja viscidula A. Gray, Syn. Fl. ed. 2. **2**[1]: 297. 1886.
Castilleja viscida Rydb. Bull. Torrey Club **34:** 38. 1907.
Yellow pine, aspen, spruce, and subalpine belts. Utah and Nevada.

24. Castilleja flava S. Wats. in King, Geol. Expl. 40th Par. **5:** 230. 1871.
Castilleja curticalyx Nels. & Macbr. Bot. Gaz. **55:** 380. 1913.
Yellow pine, aspen, and spruce belts. Montana to British Columbia, southward to Colorado and Utah.

25. Castilleja linoides A. Gray, Syn. Fl. **2**[1]: 299. 1878.
Upper Covillea, artemisia, pinyon, and yellow pine belts. Nevada and western Utah.

26. Castilleja pilosa (S. Wats.) Rydb. Mem. N. Y. Bot. Gard. **1:** 361. 1900.
Orthocarpus pilosus S. Wats in King, Geol. Expl. 40th Par. **5:** 231. 1871.
Valleys of the artemisia belt, upward to the yellow pine belt. Nevada, California, and Oregon.

18. ADENOSTEGIA Benth.

Leaves entire, linear-lanceolate to oblong, 1 to 3 cm. long, more or less villous.
  Bracts lanceolate, villous; calyx monophyllous; corolla about 20 mm. long, puberulent, the galea and lip about 7 mm. long----**8. A. canescens.**
Leaves cleft into linear or filiform divisions, if entire narrowly linear.
  Bracts entire or merely notched. Flowers scattered on filiform branches, yellow or purplish; calyx diphyllous; plant 30 to 60 cm. high, diffusely branching, puberulent or glandular----**2. A. tenuis.**
  Bracts distinctly parted.
    Plants puberulent to glabrate, 10 to 50 cm. high. Bracts 3 to 7-parted; calyx diphyllous.
      Corolla 17 mm. long or less, yellow----**4. A. ramosa.**
      Corolla about 25 mm. long, purplish----**5. A. wrightii.**
    Plants glandular-pubescent to pilose or soft-villous.
      Flowers scattered. Bracts 5 to 6 mm. long, 3-parted; calyx diphyllous; corolla about 10 mm. long; plant 30 cm. high or less, minutely viscid-pilose----**3. A. parviflora.**
Flowers capitate or in short spikes.
  Bracts commonly 3-cleft, the middle lobe twice longer than the lateral ones. Corolla about 12 mm. long, purple, tipped with yellow; plant 40 to 60 cm. high, glandular-pilose----**1. A. capitata.**
  Bracts commonly 5 to 8-cleft, the central lobes somewhat longer than the lateral ones. Plants 20 to 40 cm. high, glandular-pubescent or villous.
    Bracts with filiform irregular lobes----**6. A. kingii.**
    Bracts symmetrically parted into linear lobes----**7. A. helleri.**

1. Adenostegia capitata (Nutt.) Greene, Pittonia **2**: 180. 1891.
Cordylanthus capitatus Nutt.; Benth. in DC. Prodr. **10**: 597. 1846.
Cordylanthus bicolor A. Nels. Bot. Gaz. **54**: 416. 1912.
Yellow pine belt. Idaho and Washington, southward to Nevada and California.

2. Adenostegia tenuis (A. Gray) Greene, Pittonia **2**: 180. 1891.
Cordylanthus tenuis A. Gray, Proc. Amer. Acad. **7**: 383. 1868.
Yellow pine and aspen belts. California and western Nevada.

3. Adenostegia parviflora Ferris, Bull. Torrey Club **45**: 409. *pl. 11, f. 4*. 1918.
Yellow pine belt; Grand Canyon, Arizona.

4. Adenostegia ramosa (Nutt.) Greene, Pittonia **2**: 180. 1891.
Cordylanthus ramosus Nutt.; Benth. in DC. Prodr. **10**: 597. 1846.
Artemisia, pinyon, yellow pine, and aspen belts. Oregon and California, eastward to Montana and Colorado.

5. Adenostegia wrightii (A. Gray) Greene, Pittonia **2**: 180. 1891.
Cordylanthus wrightii A. Gray in Torr. U. S. & Mex. Bound. Bot. 120. 1859.
Artemisia, pinyon, and yellow pine belts. Southern Colorado and Utah, southward to Texas and Mexico.

6. Adenostegia kingii (S. Wats.) Greene, Pittonia **2**: 181. 1891.
Cordylanthus kingii S. Wats. in King, Geol. Expl. 40th Par. **5**: 233. 460. *pl. 22, f. 3–6*. 1871.
Artemisia, pinyon, and yellow pine belts. Southwestern Colorado to Nevada.

7. Adenostegia helleri Ferris, Bull. Torrey Club **45**: 417. 1918.
Artemisia belt. Nevada. Perhaps only a form of the preceding species.

8. Adenostegia canescens (A. Gray) Greene, Pittonia **2**: 181. 1891.
Cordylanthus canescens A. Gray, Proc. Amer. Acad. **7**: 383. 1868.
?Cordylanthus parryi S. Wats. Amer. Nat. **9**: 346. 1875.
About springs in valleys and on desert areas of the artemisia belt. Utah to California.

19. ORTHOCARPUS Nutt.

Leaves and bracts strikingly dissimilar, the former linear to linear-lanceolate, the latter ovate, ciliate. Spike dense; corolla purple, about 13 mm. long, the lip somewhat 3-saccate; plant puberulent ..... **1. O. cryptanthus.**
Leaves and bracts similar or nearly so.
  Galea of the corolla straight, the lip conspicuously 3-saccate. Plants soft-hirsute; leaves simple to pinnate.
    Corolla yellow, 12 to 15 mm. long; bracts palmately 3 to 7-cleft. **2. O. lacerus.**
    Corolla white or merely purplish, 15 to 18 mm. long; bracts similar to the leaves ..... **3. O. hispidus.**
  Galea of the corolla more or less incurved, the lip obscurely or not at all 3-saccate.
    Plant hirsute and puberulent, 10 to 40 cm. high; leaves subulate to linear-lanceolate, entire to 3-cleft above. Calyx 5 to 6 mm. long; corolla yellow, 10 to 15 mm. long ..... **4. O. luteus.**
    Plants puberulent, 10 to 50 cm. high; leaves linear-lanceolate to filiform, entire to 3-cleft.
      Spikes dense; corolla yellow, 3 to 4 times as long as the calyx. **5. O. tolmiei.**
      Spike lax; corolla white, turning purplish, about 15 mm. long, less than 3 times as long as the calyx ..... **6. O. purpureo-albus.**

1. **Orthocarpus cryptanthus** Piper, Smiths. Misc. Coll. **50**: 200. 1907.
Yellow pine and aspen belts. Oregon, California, and western Nevada.

2. **Orthocarpus lacerus** Benth. Pl. Hartw. 329. 1849.
Artemisia, pinyon, and yellow pine belts. Oregon, California, and Nevada.

3. **Orthocarpus hispidus** Benth. in DC. Prodr. **10**: 535. 1846.
Yellow pine belt. British Columbia to California, eastward to Idaho and Nevada.

4. **Orthocarpus luteus** Nutt. Gen. Pl. **2**: 57. 1818.
Artemisia belt, upward to the spruce belt. Saskatchewan to British Columbia, southward to New Mexico and Arizona.

5. **Orthocarpus tolmiei** Hook. & Arn. Bot. Beechey Voy. 379. 1840.
Yellow pine, aspen, and spruce belts. Wyoming, Idaho, and Utah.

6. **Orthocarpus purpureo-albus** A. Gray in King, Geol. Expl. 40th Par. **5**: 458. 1871.
Yellow pine, aspen, and spruce belts. Colorado and New Mexico to Idaho and Arizona.

20. PEDICULARIS L. Woodbetony

Stem short. Radical leaves exceeding the short spike; corolla yellow or purplish, the galea and lower lip nearly equal; anthers aristate at base.
Leaves deeply pinnatifid, the ovate segments doubly crenate-dentate, the teeth white-cartilaginous; corolla about 20 mm. long.....**9. P. centranthera.**
Leaves bipinnatifid, the ultimate segments entire or toothed, spinulose; corolla about 15 mm. long.....**10. P. semibarbata.**
Stems elongate, much exceeding the radical leaves.
Leaves crenulate to doubly crenate, linear or linear-lanceolate, 10 cm. long or less, more or less conspicuously white-margined. Spikes leafy-bracted.
Galea with a distinct incurved beak; leaves doubly crenate; corolla white, 12 to 15 mm. long.....**3. P. racemosa.**
Galea not produced into a distinct beak; leaves doubly crenate, conspicuously white-margined; corolla purple to white, 20 to 25 mm. long.
8. P. crenulata.
Leaves pinnatifid to bipinnatifid.
Galea produced into a long filiform upturned beak.
Spike glabrous, 3 to 20 cm. long or more; corolla reddish purple, the beak 12 to 15 mm. long.....**1. P. groenlandica.**
Spike loosely villous, rarely 10 cm. long; corolla violet purple, the beak 4 to 6 mm. long.....**2. P. attollens.**
Galea, if beaked, with a straight or incurved beak. Corolla yellowish or white.
Galea beaked.
Beak strongly incurved; racemes 10 to 20 cm. long; leaf lobes linear, dentate.....**4. P. contorta.**
Beak short and straight; racemes 3 to 12 cm. long; leaf lobes lanceolate, crenate.....**5. P. parryi.**
Galea not beaked. Leaf lobes lanceolate.
Corolla about 20 mm. long, the galea without lateral teeth; plant 1 meter high or less; leaf lobes laciniately doubly serrate.
6. P. bracteosa.
Corolla 30 mm. long or more, the galea with 2 lateral teeth; plant often 2 meters high; leaf lobes dentate.....**7. P. grayi.**

1. Pedicularis groenlandica Retz. Fl. Scand. Prodr. ed. 2. 145. 1795.
Spruce and alpine belts. Greenland to Alaska, southward to New Mexico and California.

2. Pedicularis attollens A. Gray, Proc. Amer. Acad. **7**: 384. 1868.
Yellow pine, aspen, and spruce belts. California and western Nevada.

3. Pedicularis racemosa Dougl.; Hook. Fl. Bor. Amer. **2**: 108. 1838.
Spruce and alpine belts. Alberta to British Columbia, southward to New Mexico and California.

4. Pedicularis contorta Benth.; Hook. Fl. Bor. Amer. **2**: 108. 1838.
Yellow pine, aspen, and spruce belts; northern Nevada (?). Alberta and British Columbia, southward to California.

5. Pedicularis parryi A. Gray, Amer. Journ. Sci. II. **34**: 250. 1860.
Spruce and alpine belts. Wyoming to New Mexico and Utah.

6. Pedicularis bracteosa Benth.; Hook. Fl. Bor. Amer. **2**: 110. 1838.
Yellow pine, aspen, spruce, and alpine belts. Alberta and British Columbia, southward to Colorado and California.

7. Pedicularis grayi A. Nels. Proc. Biol. Soc. Washington **17**: 100. 1904.
Aspen, spruce, and subalpine belts. Wyoming to New Mexico and eastern Utah.

8. Pedicularis crenulata Benth. in DC. Prodr. **10**: 568. 1846.
Pedicularis albomarginata Jones, Contr. West. Bot. **8**: 38. 1898.
Yellow pine, aspen, and spruce belts. Wyoming and Colorado, westward to Nevada.

9. Pedicularis centranthera A. Gray in Torr. U. S. & Mex. Bound. Bot. 120. 1859.
Yellow pine and lower aspen belts. Colorado and New Mexico, westward to California.

10. Pedicularis semibarbata A. Gray, Proc. Amer. Acad. **7**: 385. 1868.
Yellow pine, aspen, and spruce belts. California and western Nevada.

115. BIGNONIACEAE. Bignonia Family

Shrubs or low trees; leaves estipulate, opposite, simple or compound (linear, 5 to 10 cm. long, in our species); flowers in terminal racemes; calyx of 2 more or less united carpels; corolla gamopetalous, irregular (in our species), white or purplish, the lobes erose; stamens didynamous, inserted on the corolla tube alternate with the lobes; style 1; ovary 2-celled, the parietal placentae concrescent; fruit a 2-valved long-linear capsule; seeds numerous, flat, winged.

1. CHILOPSIS Don. DESERTWILLOW

1. Chilopsis linearis (Cav.) Sweet, Hort. Brit. 283. 1827.
Bignonia linearis Cav. Icon. Pl. **3**: 35. 1794.
Mesas, hillsides, and canyons of the Covillea belt. Western Texas to southern Nevada, California, and Mexico.

116. MARTYNIACEAE. Martynia Family

Annual or perennial herbs; leaves mostly opposite, the blades ample (suborbicular to cordate-ovate, sinuate, in our species); inflorescence few-flowered, axillary, racemose; calyx inferior, 4 or 5-lobed; corolla campanulate, obscurely 2-lipped; stamens 4; ovary 1-celled, the 2 placentae parietal; fruit (in our species) a long-beaked capsule, 10 to 15 cm. long, the beak curved.

1. MARTYNIA L. UNICORNPLANT

1. Martynia louisiana Mill. Gard. Dict. ed. 8. *Martynia* No. 3. 1768.

Waste places. Mexico, northward to southern Nevada, Utah, Iowa, and Indiana.

117. OROBANCHACEAE. Broomrape Family

Root-parasites, less than 40 cm. in height, destitute of green foliage; leaves scale-like, reduced; calyx with 4 or 5 lobes or sepals; corolla 2-labiate; stamens 4, didynamous; style 1; stigma capitate or 2-lobed; ovary 1, 2-valved, the placentae 2 or 4, parietal; ovules numerous; fruit a capsule.

Flowers sessile, spicate. Plant brownish red, 25 cm. high or less, flowering almost from the base; scales orbicular or nearly so; calyx truncate, toothed; upper lip of corolla 2-lobed, the lower 3-lobed.
3. BOSCHNIAKIA.

Flowers pedunculate or pedicellate, solitary, racemose, or spicate, purplish or yellowish. Calyx 5-cleft.

Bractlets subtending the calyces or pedicels none; peduncles or scapes long and slender; corolla elongate, the tube curved----------1. THALESIA.

Bractlets subtending the calyces or pedicels 1 or 2; pedicels short; inflorescence spicate; corolla slightly curved----------2. OROBANCHE.

1. THALESIA Raf. CANCER-ROOT

Calyx lobes subulate, longer than the tube----------1. T. uniflora.
Calyx lobes triangular, shorter than the tube----------2. T. fasciculata.

1. Thalesia uniflora (L.) Britton, Mem. Torrey Club **5**: 298. 1894.
Orobanche uniflora L. Sp. Pl. 633. 1753.

Yellow pine belt. Newfoundland to British Columbia, southward to Virginia, Texas, and California.

2. Thalesia fasciculata (Nutt.) Britton, Mem. Torrey Club **5**: 298. 1894.
Orobanche fasciculata Nutt. Gen. Pl. **2**: 59. 1818.

Artemisia belt, upward to the subalpine belt. Saskatchewan to British Columbia, southward to Mexico.

2. OROBANCHE L. BROOMRAPE

Corolla 15 to 18 mm. long. Anthers glabrous or nearly so--1. O. ludoviciana.
Corolla 20 to 25 mm. long.
Anthers woolly----------2. O. multiflora.
Anthers glabrous or nearly so----------3. O. californica.

1. Orobanche ludoviciana Nutt. Gen. Pl. **2**: 58. 1818.

Artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, southward to Texas and California.

2. Orobanche multiflora Nutt. Journ. Acad. Phila. II. **1**: 179. 1848.

Covillea and artemisia belts. Colorado to Texas, and Mexico.

3. Orobanche californica Cham. & Schlecht. Linnaea **3**: 134. 1828.

Covillea, artemisia, and pinyon belts. Washington to California and Nevada.

3. BOSCHNIAKIA C. A. Meyer

1. Boschniakia strobilacea A. Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 118. 1857.

Yellow pine and aspen belts. Washington to California and Nevada.

118. PINGUICULACEAE. Bladderwort Family

Slender, scapose, aquatic or marsh herbs; leaves (in our genus) bladder-bearing, dissected into filiform segments; scapes with 1 or more flowers; calyx 2-lipped; corolla yellow, 2-lipped, spurred or saccate; stamens 2; style 1, with 2 cleft stigma; ovary free, the placenta central; seed numerous, rugose.

1. UTRICULARIA L. Bladderwort

Leaves dichotomously dissected; corolla 6 mm. broad or less, scarcely spurred. **1. U. minor.**
Leaves twice or thrice pinnately dissected; corolla about 10 mm. broad, spurred **2. U. vulgaris.**

1. Utricularia minor L. Sp. Pl. 18. 1753.

Shallow water of the yellow pine, aspen, and spruce belts; Sierra Nevada and Wasatch Mountains. Greenland to Alaska, southward to New Jersey, Utah, and California; also in Europe and Asia.

2. Utricularia vulgaris L. Sp. Pl. 18. 1753.

In shallow water; artemisia belt, upward to the subalpine belt. Throughout most of North America; also in Europe, Asia, and Africa.

119. PLANTAGINACEAE. Plantain Family

Annual or perennial, acaulescent herbs; leaves linear to ovate, parallel-veined; flowers 4-merous, small, in spikes on more or less elongated scapes; calyx of 4 imbricate, persistent sepals; corolla tubular or urceolate, 4-lobed, salverform, more or less scarious; stamens 4 (or 2), inserted on the corolla tube; style 1; ovary 2-celled, superior; fruit a circumscissile capsule; seeds one to several, oblong.

1. PLANTAGO L. Plantain

Bracts surpassing the flowers. Leaves linear; plants villous **7. P. ignota.**
Bracts equaling or shorter than the flowers.
  Leaves villous, linear.
    Spikes headlike or short-oblong, 1 to 3 cm. long; bracts ovate. **6. P. scariosa.**
    Spikes linear, 3 to 10 cm. long; bracts linear **5. P. purshii.**
Leaves glabrous or nearly so.
  Leaves linear. Spikes linear, narrow **8. P. elongata.**
  Leaves lanceolate to ovate.
    Leaves ovate, obtuse, commonly 5-ribbed. Spikes linear, 5 cm. long or more **1. P. major.**
    Leaves lanceolate to oblong-lanceolate.
      Crown conspicuously brownish-silky. Leaves oblong-lanceolate, 3 or 5-ribbed; spikes 5 to 15 cm. long **4. P. eriopoda.**
      Crown not conspicuously brown-silky.
        Leaves oblong-lanceolate, 3 to 20 cm. long; spikes linear; plants 10 to 15 cm. high **3. P. tweedyi.**
        Leaves lanceolate, on long petioles, strongly 3 or 5-ribbed; spikes ovate to cylindric; plants 20 cm. high or more **2. P. lanceolata.**

1. Plantago major L. Sp. Pl. 112. 1753.

About settlements; introduced from Europe.

2. Plantago lanceolata L. Sp. Pl. 113. 1753.

About settlements; introduced from Europe.

3. Plantago tweedyi A. Gray, Syn. Fl. ed. 2. **2**[1]: 390. 1886.

Mountain sides and canyons of the aspen, spruce, and alpine belts. Montana to Colorado and Utah.

4. Plantago eriopoda Torr. Ann. Lyc. N. Y. **2**: 237. 1828.

Plains, canyons, and slopes of the artemisia and pinyon belts. Nova Scotia to Alberta, southward to New Mexico and Nevada.

5. Plantago purshii Roem. & Schult. Syst. Veg. **3**: 120. 1818.

Plains and dry slopes of the Covillea, artemisia, and pinyon belts. Ontario to Texas, westward to British Columbia and Arizona.

6. Plantago scariosa Morris, Bull. Torrey Club **27**: 117. 1900.

Plantago gooddingii Nels. & Kennedy, Muhlenbergia **3**: 142. 1908.

Plains and slopes of the Covillea belt. Southern Utah and Arizona to California.

7. Plantago ignota Morris, Bull. Torrey Club **28**: 119. 1901.

Plains and dry hillsides of the Covillea and artemisia belts. Southwestern Utah to Arizona and California.

8. Plantago elongata Pursh, Fl. Amer. Sept. 729. 1814.

Valleys and artemisia plains. Washington to Saskatchewan, southward to Texas.

120. RUBIACEAE. Madder Family

Trees, shrubs, or (our species) herbs; leaves opposite or verticillate, with persistent stipules or stipular lines; flowers mostly cymose; calyx tube adnate to the ovary; corolla gamopetalous; stamens as many as the lobes of the corolla, inserted on the tube; style short or elongate; stigma entire or cleft; ovary 1 to 10-celled; ovules solitary to numerous in each cell; fruit various.

Corolla tube 20 mm. long (in our species). Annual or perennial herb, 30 cm. high or less; leaves linear; style slender; stigmas 2; pod loculicidal across the top ..... **1. HOUSTONIA.**

Corolla tube 6 mm. long or less.

Stipules minute; leaves opposite, lanceolate; perennial, with terminal cymose inflorescence; flowers small, long-pediceled; ovary 2-celled; fruit small. **2. KELLOGGIA.**

Stipules leaflike; leaves opposite or verticillate; annuals or perennials, with axillary or terminal, cymose inflorescence; ovary 2-celled; ovules solitary; fruit didymous ..... **3. GALIUM.**

1. HOUSTONIA L.

1. Houstonia rubra Cav. Icon. Pl. **5**: 48. *pl. 474, f. 1.* 1799.

Houstonia saxicola Eastw. Proc. Calif. Acad. II. **6**: 291. 1896.

Plains and rock hillsides of the artemisia and pinyon belts. Southern Utah to New Mexico, Arizona, and Mexico.

2. KELLOGGIA Torr.

1. Kelloggia galioides Torr. in Wilkes, U. S. Expl. Exped. **17**: 332. 1874.

Canyons, forests, and moist mountain sides of the pinyon belt, upward to the spruce belt. Wyoming to Arizona, westward to Washington and California.

3. GALIUM L. BEDSTRAW

Stems retrorsely hispid.
Fruit glabrous or nearly so. Leaf margin and midrib smooth, the blade linear-oblanceolate, 8 to 10 mm. long____6. G. trifidum subbiflorum.
Fruit decidedly hispid or granular-scabrous.
Plants annual.
Fruit 3 to 5 mm. in diameter, bristly; leaves 2 to 7 cm. long, oblanceolate to linear_____1. G. aparine.
Fruit 1 to 2 mm. in diameter, hispid; leaves 1 to 2.5 cm. long, linear to linear-lanceolate_____2. G. vaillantii.
Plants perennial.
Pedicels much exceeding the bracts; fruit granular-scabrous; leaves oblong or lanceolate_____7. G. asperrimum.
Pedicels equaling the bracts; fruit long-bristly; leaves ovate-oblong, 1 cm. long or less_____8. G. acutissimum.
Stems smooth or pubescent.
Leaves 3 or 5-ribbed. Perennials.
Leaves blunt, linear to lanceolate, 1 to 4 cm. long; fruit smooth at maturity_____4. G. boreale.
Leaves mucronate, ovate to ovate-lanceolate, 6 to 14 mm. long; fruit hirsute. Flowers dioecious.
Leaves scabro-puberulent_____12. G. multiflorum.
Leaves glabrous.
Leaves broadly ovate_____13. G. bloomeri.
Leaves lanceolate to ovate_____14. G. watsoni.
Leaves 1-ribbed.
Leaves pubescent, ovate-lanceolate, rigid, cuspidate, 8 to 10 mm. long.
Plant suffrutescent; flowers dioecious; fruit hispid__11. G. stellatum.
Leaves (except the margin) glabrous.
Leaves sharp-pointed, stiff, oblong to ovate-lanceolate, 5 to 10 mm. long.
Ovary and fruit with long bristles_____10. G. matthewsii.
Leaves mostly obtuse (often sharp-pointed in no. 9).
Plant annual. Leaves linear-oblong to oblanceolate, commonly less than 4 mm. broad; fruit hispid_____3. G. bifolium.
Plants perennial.
Leaves 15 to 30 mm. long, 5 mm. broad or more, oblong, acute; ovary and fruit hispid_____9. G. triflorum.
Leaves smaller, obovate or spatulate-oblong, 2 to 6 (rarely 10) mm. long; fruit glabrous. Plant low, cespitose____5. G. brandegei.

1. Galium aparine L. Sp. Pl. 108. 1753.

Shady places in valleys and draws, upward to 1,800 meters. New Brunswick to Florida, westward to British Columbia and California; also in Europe and Asia.

2. Galium vaillantii DC. & Lam. Fl. France 4: 263. 1805.

Shady places and draws, upward to 2,400 meters; introduced from Europe. Ontario to British Columbia, southward to Texas and California.

3. Galium bifolium S. Wats. in King, Geol. Expl. 40th Par. 5: 134. 1871.

Wet places and draws and on hillsides of the pinyon, yellow pine, and aspen belts. Montana to Colorado, westward to Washington and California.

4. Galium boreale L. Sp. Pl. 108. 1753.

Pinyon belt, upward to the spruce belt. Quebec to Alaska, southward to New Jersey, Colorado, and California; also in Europe and Asia.

5. Galium brandegei A. Gray, Proc. Amer. Acad. **12**: 58. 1876.

Moist places in the pinyon belt, upward to 3,000 meters. Wyoming to New Mexico and California.

6. Galium trifidum subbiflorum Wiegand, Bull. Torrey Club **24**: 399. 1897.

Wet places in the pinyon belt, upward to 3,000 meters. Washington to Alberta, southward to Arizona and California.

7. Galium asperrimum A. Gray, Mem. Amer. Acad. n. ser. **4**: 60. 1849.

Shady and wet places of the pinyon, yellow pine, and aspen belts. New Mexico and Arizona, to Utah, California, and Washington.

8. Galium acutissimum A. Gray, Proc. Amer. Acad. **7**: 350. 1868.

Dry hillsides of the pinyon and yellow pine belts. Utah, Arizona, and New Mexico.

9. Galium triflorum Michx. Fl. Bor. Amer. **1**: 80. 1803.

Moist places in the pinyon, yellow pine, and aspen belts. Newfoundland to Alaska, southward to Alabama, Colorado, and California.

10. Galium matthewsii A. Gray, Proc. Amer. Acad. **19**: 80. 1883.

In crevices of rocks in canyons and on hillsides of the upper Covillea, artemisia, and pinyon belts. Utah and Arizona, westward to California.

11. Galium stellatum Kellogg, Proc. Calif. Acad. **2**: 97. *f.* 26. 1863.

Dry hillsides and rocky canyons of the Covillea, artemisia, and pinyon belts Southern Utah and Arizona, westward to California.

12. Galium multiflorum Kellogg, Proc. Calif. Acad. **2**: 97. *f.* 27. 1863.

Dry rocky places of the pinyon, yellow pine, and aspen belts. Utah to California.

13. Galium bloomeri A. Gray, Proc. Amer. Acad. **6**: 538. 1865.

Dry rocky places of the pinyon, yellow pine, and aspen belts. Utah to California.

14. Galium watsoni (A. Gray) Heller, Bull. Torrey Club **25**: 627. 1898.

Galium multiflorum watsoni A. Gray, Syn. Fl. **1**[2]: 40. 1884.

Rocky places in the pinyon and yellow pine belts. Idaho to Arizona.

121. CAPRIFOLIACEAE. Honeysuckle Family

Trees, shrubs, or perennial herbs; leaves mostly opposite, estipulate; flowers commonly 5-merous, regular or irregular; calyx tube adnate to the 1 to 5-celled ovary; corolla gamopetalous, lobed or cleft; stamens inserted on the corolla tube, alternate with the lobes; style 1; ovules solitary in each cell; fruit a drupe or berry.

Leaves compound, once or twice pinnate. Inflorescence cymose-paniculate; calyx teeth small or obsolete; corolla rotate, white; ovary 3 to 5-celled; fruit a berry, mostly 3-seeded.....**1. SAMBUCUS.**

Leaves simple.

Plant a low trailing pubescent perennial. Leaves obovate or rotund, crenately few-toothed; peduncles filiform, terminating short leafy branches; corolla campanulate, rose-colored or purplish; ovary 3-celled; fruit 1-seeded, dry. **3. LINNAEA.**

Plants tall, erect or climbing shrubs.

Corolla regular or nearly so, campanulate to tubular, 3 to 12 mm. long; flowers in small, axillary or terminal clusters. **2. SYMPHORICARPOS.**

Corolla irregular, cylindric-campulate to tubular-funnelform, 12 to 40 mm. long.....**4. LONICERA.**

1. SAMBUCUS L. Elder

Inflorescence flat-topped.

Leaves glabrous or nearly so; leaflets ovate to narrowly oblong, serrate; fruit bluish black, with a bloom; arborescent shrub, 2 to 6 meters high. **1. S. caerulea.**

Leaves pubescent or tomentulose beneath, sometimes bipinnate; leaflets ovate to ovate-lanceolate, serrulate; fruit dark purple; shrub 1.5 to 2 meters high. Inflorescence sometimes 25 cm. broad---------- **2. S. velutina.**

Inflorescence convex.

Inflorescence open, 5 cm. broad or more (larger in fruit); leaflets ovate-oblong or lance-oblong, abruptly acuminate, glabrous, serrate, 4 to 15 cm. long; fruit black; shrub 1 to 3 meters high------ **3. S. melanocarpa.**

Inflorescence compact, 3 to 4 cm. broad (in flower); leaflets ovate or ovate-oblong, acute or short-acuminate, serrate, glabrous, 3 to 9 cm. long; fruit red; shrub 0.5 to 2 meters high---------- **4. S. microbotrys.**

1. Sambucus caerulea Raf. Alsogr. Amer. 48. 1838.

Sambucus glauca Nutt.; Torr. & Gray, Fl. N. Amer. **2:** 13. 1841.

Moist slopes and canyons of the yellow pine and aspen belts. Alberta and British Columbia, southward to Arizona and California.

2. Sambucus velutina Dur. & Hilg. U. S. Rep. Expl. Miss. Pacif. **5:** 8. 1855.

Along creeks in canyons of the artemisia, pinyon, and yellow pine belts. California and western Nevada.

3. Sambucus melanocarpa A. Gray, Proc. Amer. Acad. **19:** 76. 1883.

Moist places in the aspen and spruce belts. Montana to New Mexico, westward to Washington and California.

4. Sambucus microbotrys Rydb. Bull. Torrey Club **28:** 503. 1901.

Canyons, plateaus, and slopes of the aspen, spruce, and subalpine belts. Wyoming to New Mexico, westward to Nevada and Arizona.

2. SYMPHORICARPOS Ludw. Snowberry

Corolla tubular-funnelform, 8 to 15 mm. long, glabrous within. Fruit white.

Leaves oblong to broadly oval, 10 to 15 mm. long, mostly acute, entire or dentate, pubescent to glabrate; style glabrous---------- **6. S. oreophilus.**

Leaves narrowly elliptic or oblanceolate, acute or obtuse, 9 to 18 mm. long, glaucous, pubescent; style hairy---------- **7. S. longiflorus.**

Corolla campanulate or campanulate-oblong, 3 to 8 mm. long, pubescent within.

Corolla broadly campanulate, 3 to 5 mm. long, bearded within. Style glabrous.

Twigs pubescent. Leaves broadly ovate to elliptic, grayish-pubescent, 1 to 2 cm. long, mostly entire; fruit 6 to 8 mm. long; trailing shrub. **2. S. mollis.**

Twigs glabrous or nearly so.

Flowers several in interrupted spikes or axillary clusters; fruit globose, 8 to 10 mm. in diameter; leaves oval, 2 to 5 cm. long, obtuse, subentire to sinuate-dentate, glabrous to pubescent beneath. **1. S. albus.**

Flowers 1 to 3 in terminal clusters, or solitary and axillary; fruit oval, 4 to 6 mm. in diameter, leaves broadly oval to orbicular, 1 to 2.5 cm. long, entire, pubescent---------- **1a. S. albus pauciflorus.**

Corolla narrowly campanulate, 6 to 8 mm. long.
Twigs and leaves puberulent, the latter round-oval, obtuse, 1 to 2 cm. long. Style glabrous; fruit oblong, white_____3. **S. rotundifolius.**
Twigs glabrous; leaves glaucous beneath.
Leaves broadly ovate or oval, 3 to 4 cm. long, mostly obtuse, entire to sinuate-toothed, sparingly pubescent, glabrous in age; fruit oval, 8 mm. long_____4. **S. utahensis.**
Leaves oval, acute at both ends, 2 cm. long or less, puberulent or glabrate; fruit oval, 10 mm. long_____5. **S. vaccinioides.**

1. **Symphoricarpos albus** (L.) Blake, Rhodora **16**: 118. 1914.
Vaccinium album L. Sp. Pl. 350. 1753.
Symphoricarpos racemosus Michx. Fl. Bor. Amer. **1**: 107. **1803.**
Valleys and canyons of the artemisia, pinyon, and yellow pine belts. Nova Scotia to British Columbia, southward to Virginia, Colorado, and California.

1a. **Symphoricarpos albus pauciflorus** (Robbins) Blake, Rhodora **16**: 119. 1914.
Symphoricarpos racemosus pauciflorus Robbins in A. Gray, Man. ed. 5. 203. 1867.
Pinyon and yellow pine belts. Vermont to Pennsylvania, westward to Nebraska, New Mexico, and British Columbia.

2. **Symphoricarpos mollis** Nutt.; Torr. & Gray, Fl. N. Amer. **2**: 4. 1841.
Mountain sides and canyons of the artemisia and yellow pine belts. California and western Nevada.

3. **Symphoricarpos rotundifolius** A. Gray, Pl. Wright. **2**: 66. 1853.
Symphoricarpos glaucus Eastw. Bull. Torrey Club **30**: 497. 1903.
? *Symphoricarpos austinae* Eastw. Bull. Torrey Club **30**: 499. 1903.
Foothills and canyons, upward to the aspen belt. Wyoming to western Texas, westward to Oregon and California.

4. **Symphoricarpos utahensis** Rydb. Bull. Torrey Club **26**: 544. 1899.
Mountain sides of the yellow pine and aspen belts. Wyoming and Colorado to Utah and Idaho.

5. **Symphoricarpos vaccinioides** Rydb. Mem. N. Y. Bot. Gard. **1**: 371. 1900.
Mountain sides of the yellow pine and aspen belts. Montana to Colorado, westward to Washington and Nevada.

6. **Symphoricarpos oreophilus** A. Gray, Journ. Linn. Soc. Bot. **14**: 12. 1873.
Mountain sides and canyons, upward to the spruce belt. Colorado and New Mexico, westward to Idaho and California.

7. **Symphoricarpos longiflorus** A. Gray, Journ. Linn. Soc. Bot. **14**: 12. 1873.
Symphoricarpos fragrans Nels. & Kennedy, Muhlenbergia **3**: 143. 1908.
Foothills and canyons of the artemisia, pinyon, and yellow pine belts. Utah and Arizona, westward to Nevada and southeastern California.

3. LINNAEA Gronov. TWINFLOWER

1. **Linnaea borealis americana** (Forbes) Rehder, Rhodora **6**: 56. 1904.
Linnaea americana Forbes, Hort. Woburn. 135. 1833.
Pine forests at 2,400 meters or more; Uintah Mountains. Newfoundland to Alaska, southward to Maryland, Colorado, and Oregon.

4. LONICERA L. Honeysuckle

Upper leaves connate-perfoliate. Flowers mostly sessile, in capitate clusters or interrupted spikes; corolla funnelform, 2 to 4 cm. long; ovary 2 or 3-celled; fruit a few-seeded berry.

Corolla gibbous at base, 2 to 3 cm. long; leaves broadly oval or obovate, 3 to 7 cm. long, glabrous except at the margin----------1. L. ciliosa.

Corolla not gibbous at base, 3 to 4 cm. long; leaves ovate or elliptic, commonly 4 cm. long or less, glabrous or glandular, ciliate-----2. L. arizonica.

Upper leaves not connate-perfoliate. Corolla gibbous at base.

Bracts subtending the flowers ovate, 1 cm. long or more. Corolla yellow, cylindric-campanulate; fruit a dark purple berry; leaves oval to obovate, acute or acuminate, pubescent and glandular-dotted---6. L. involucrata.

Bracts subtending the flowers small or wanting.

Corolla dark purple, 10 mm. long or less. Peduncles filiform, 25 to 30 mm. long; leaves ovate, oval, or obovate, 2 to 4 cm. long, acute or acuminate, pubescent when young----------4. L. conjugialis.

Corolla ochroleucous or yellow.

Corolla about 10 mm. long; leaves oblong or elliptic, obtuse, 3 cm. long or less, villous-pubescent to glabrous; fruit bluish black.

3. L. caerulea.

Corolla 15 mm. long or more, spurred at base; leaves elliptic, rounded at both ends, glabrous or nearly so, 2 to 4 cm. long; fruit red.

5. L. utahensis.

1. Lonicera ciliosa (Pursh) Poir.; Steud. Nom. Bot. 1: 493. 1821.

Caprifolium ciliosum Pursh, Fl. Amer. Sept. 160. 1814.

Yellow pine belt. Montana to British Columbia, southward to Arizona and California.

2. Lonicera arizonica Rehder, Trees and Shrubs 1: 45. *pl. 23.* 1902.

Yellow pine belt. New Mexico and Arizona.

3. Lonicera caerulea L. Sp. Pl. 174. 1753.

Xylosteon caeruleum DuM. de Cours. Bot. Cult. ed. 2. 4: 336. 1811.

Moist ground and along watercourses of the yellow pine and aspen belts. Labrador to Alaska, southward to New England, Nevada, and California.

4. Lonicera conjugialis Kellogg, Proc. Calif. Acad. 2: 67. *f. 15.* 1863.

Xylosteon conjugiale Howell, Fl. Northw. Amer. 282. 1902.

Slopes and canyons of the yellow pine, aspen, and spruce belts. Western Nevada and California.

5. Lonicera utahensis S. Wats. in King, Geol. Expl. 40th Par. 5: 133. 1871.

Xylosteon utahense Howell, Fl. Northw. Amer. 282. 1900.

Slopes and canyons of the yellow pine belt, upward to the subalpine belt. Montana to New Mexico, westward to British Columbia, Oregon, and Utah.

6. Lonicera involucrata Banks; Spreng. Syst. Veg. 1: 759. 1825.

Xylosteon involucratum Richards. Bot. Frankl. Journ. 733. 1823.

Distegia involucrata Raf. New Fl. N. Amer. 3: 21. 1836.

Aspen and spruce belts. Quebec to Michigan, Colorado, California, and Alaska.

122. ADOXACEAE. Moschatel Family

Low glabrous herbs with tuberiferous rootstocks; leaves ternately compound, the divisions broad, with rounded teeth; flowers small, in headlike clusters;

calyx 2 or 3-lobed; corolla greenish, rotate, 4 to 6-lobed, the stamens 8 or more, inserted in pairs on the corolla tube; style 3 to 5-parted; ovary 3 to 5-celled; fruit a small drupe.

1. ADOXA L.

1. **Adoxa moschatellina** L. Sp. Pl. 367. 1753. MOSCHATEL.
Spruce and alpine belts; Uintah Mountains. Arctic America, southward to Wisconsin, Iowa, and New Mexico; also in the Old World.

123. VALERIANACEAE. Valerian Family

Annual or perennial, mostly sweet-scented herbs; stems simple or dichotomous; leaves opposite, simple or compound; flowers cymose, perfect, monoecious, or dioecious; calyx lobes 3 to 5, pappuslike or obsolete; corolla gamopetalous, salverform or funnelform; stamens 1 to 4, adnate to the corolla tube; ovary inferior, 3-celled; fruit a 1-seeded nutlet, crowned with the calyx or naked.

Plants annual; leaves linear-oblong to elliptic or oblanceolate, entire; calyx limb obsolete or nearly so; corolla spurred or gibbous. **1. VALERIANELLA.**

Plants perennial; leaves simple or compound; calyx limb of 3 or more plumose lobes; corolla equally 5-lobed, gibbous_____**2. VALERIANA.**

1. VALERIANELLA Hill

Stems dichotomous. Leaves spatulate or oblanceolate_____**1. V. locusta.**
Stems not dichotomous, simple or branching.
Corolla scarcely bilabiate, white or pinkish, the spur as long as the tube; fruit broad-winged, obtusely angled dorsally_____**2. V. macrocera.**
Corolla bilabiate; fruit strongly keeled dorsally, winged__**3. V. aphanoptera.**

1. **Valerianella locusta** (L.) Betcke, "Anim. Val. 10. 1826."
Valeriana locusta L. Sp. Pl. 33. 1753.
Fields and waste places; Idaho. Introduced from Europe in the eastern United States.

2. **Valerianella macrocera** (Torr. & Gray) A. Gray, Proc. Amer. Acad. **19**: 83. 1883.
Plectritis macrocera Torr. & Gray, Fl. N. Amer. **2**: 50. 1841.
Artemisia belt. Idaho and Washington, southward to Arizona and California.

3. **Valerianella aphanoptera** A. Gray, Proc. Amer. Acad. **19**: 83. 1883.
Artemisia belt; southern Oregon. Washington and Oregon.

2. VALERIANA L. VALERIAN

Leaves thick, entire or pinnatifid, the veining almost parallel. Plants 1 meter high or less.
Ovary and fruit pubescent or glabrous; corolla of the staminate plant 3 to 4 mm. broad_____**1. V. edulis.**
Ovary and fruit glabrous and muricate; corolla of the staminate plant 2.5 to 3 mm. broad_____**2. V. trachycarpa.**
Leaves thin, the cauline ones pinnate.
Leaflets (at least the terminal) toothed. Herbage puberulent; leaves 3 to 7-divided, the leaflets linear-oblong to obovate; corolla about 3 mm. long_____**3. V. puberula.**

Leaflets entire. Stem leaves with 3 to 9 elliptic or lanceolate leaflets.
Ovary and fruit pubescent; corolla 2 to 4 mm. long____4. V. micrantha.
Ovary and fruit usually glabrous; corolla 4 to 8 mm. long.
5. V. occidentalis.

1. Valeriana edulis Nutt.; Torr. & Gray, Fl. N. Amer. **2**: 48. 1841.
Patrinia ceratophylla Hook. Fl. Bor. Amer. **1**: 290. 1834. Not *Valeriana ceratophylla* H. B. K. 1818.
Yellow pine, aspen, and spruce belts. Ontario to Ohio, westward to British Columbia and California.

2. Valeriana trachycarpa Rydb. Bull. Torrey Club **31**: 645. 1905.
Yellow pine, aspen, and spruce belts. Wyoming to New Mexico and Arizona.

3. Valeriana puberula Piper, Smiths. Misc. Coll. **50**: 202. 1907.
Yellow pine belt. Oregon, California, and western Nevada.

4. Valeriana micrantha E. Nels. Erythea **7**: 166. 1899.
Yellow pine, aspen, and spruce belts. Montana and Idaho to Colorado and Utah.

5. Valeriana occidentalis Heller, Bull. Torrey Club **25**: 269. 1898.
Valeriana acutiloba Rydb. Bull. Torrey Club **28**: 24. 1901.
?*Valeriana pubicarpa* Rydb. Bull. Torrey Club **36**: 697. 1909.
?*Valeriana puberulenta* Rydb. Bull. Torrey Club **36**: 697. 1909.
Yellow pine, aspen, and spruce belts. Montana to Colorado, westward to British Columbia.

124. DIPSACACEAE. Teasel Family

Annual or perennial herbs; leaves opposite, estipulate; flowers born on a globose or elongate receptacle; corolla lilac-purple, epigynous, tubular-funnelform, 2 to 5-lobed; stamens 2 to 4, inserted on the corolla tube, the filaments distinct, the anthers versatile; ovary inferior, 1-celled; style filiform; fruit an achene, crowned by the persistent calyx.

Involucral bracts rigid, narrow, spinulose-toothed; receptacle elongate; stout biennial, 1 meter high or more; leaves sessile, lanceolate to oblong, crenate to entire, perfoliate above; flower heads ovoid, 3 cm. long or more.
1. DIPSACUS.
Involucral bracts ovate, entire; receptacle globose; stout pubescent perennial, 1 meter high or less; leaves lance-ovate, often deeply pinnatifid; flower heads 2 cm. broad or more_____2. SCABIOSA.

1. DIPSACUS L. Teasel

1. Dipsacus sylvestris Huds. Fl. Angl. 49. 1762.
Waste places. Maine to North Carolina, westward to Utah; native of Europe.

2. SCABIOSA L.

1. Scabiosa arvensis L. Sp. Pl. 99. 1753.
In pastures, Fillmore National Forest, Utah; introduced from the Old World. Quebec to New England and Pennsylvania.

125. CUCURBITACEAE. Gourd Family

Annual or perennial herbs, prostrate or trailing, mostly tendril-bearing; leaves simple, entire to palmately lobed; flowers axillary to the alternate leaves, monoecious; calyx tube coherent with the ovary, the limb 5-toothed or lobed;

corolla gamopetalous; stamens usually 3, more or less united, the anthers 1 or 2-celled; ovary 2 or 3-celled; stigma 3 to 5-lobed; fruit fleshy; seeds large, compressed.

Flowers small, white or greenish, the staminate racemose or paniculate, the pistillate solitary; fruit globose, about 5 cm. long, densely spiny. Leaves 5 or 7-lobed, the lobes acute ..... 1. MARAH.
Flowers large, yellow, solitary; fruit indehiscent, 10 cm. or less in diameter. ..... 2. CUCURBITA.

1. MARAH Kellogg. Bigroot

1. **Marah fabaceus** (Naud.) Greene, Leaflets 2: 36. 1910.
Echinocystis fabacea Naud. Ann. Sci. Nat. IV. Bot. 12: 154. *pl.* 9. 1859.
Megarrhiza californica Torr. U. S. Rep. Expl. Miss. Pacif. 6: 74. 1857.
Covillea belt; Fort Mohave. California and western Arizona (?).

2. CUCURBITA L. Gourd

Leaves deltoid-ovate, entire or angled, scabrous ..... 1. C. foetidissima.
Leaves 5-lobed, cinereous, densely so on the ribs and lateral veins, the lobes entire or toothed ..... 2. C. palmata.

1. **Cucurbita foetidissima** H. B. K. Nov. Gen. & Sp. 2: 123. 1817.
Covillea and artemisia belts. Nebraska to California, southward to Missouri, Texas, and Mexico.

2. **Cucurbita palmata** S. Wats. Proc. Amer. Acad. 11: 137. 1876.
Covillea belt; Needles. Southern California.

126. CAMPANULACEAE. Bellflower Family

Annuals or perennials; leaves alternate, estipulate; flowers solitary, racemose or spicate, 5-merous; calyx adnate to the ovary; corolla gamopetalous; stamens inserted on the corolla, alternate with the lobes; style simple; stigma 2 to 5-lobed; ovary commonly 2 to 5-celled, the placentae central; fruit a capsule.

Corolla campanulate or rotate.
Stems filiform; leaves clasping, orbicular. Delicate annuals. ..... 1. HETEROCODON.
Stems stout; stem leaves lanceolate or linear ..... 2. CAMPANULA.
Corolla rotate, short and broad. Leaves sessile or clasping, round-cordate, crenate ..... 3. SPECULARIA.

1. HETEROCODON Nutt.

1. **Heterocodon rariflorum** Nutt. Trans. Amer. Phil. Soc. 8: 255. 1843.
About lakes of the artemisia, pinyon, and yellow pine belts. British Columbia to Idaho, Nevada, and California.

2. CAMPANULA L. Bellflower

Corolla 8 to 12 mm. long; leaves 2.5 cm. long or less, the lowest spatulate or oblong, the uppermost linear. Alpine plant, 3 to 10 cm. high. ..... 1. C. uniflora.

Corolla 12 to 20 mm. long; leaves 2 to 6 cm. long.
Stems commonly 1-flowered; radical leaves spatulate, the upper linear, about 3 cm. long; plants 30 cm. high or more ..... 2. C. parryi.
Stems commonly 1 to 9-flowered; radical leaves orbicular or cordate, petioled, the upper linear, about 6 cm. long; plants 10 to 40 cm. high. ..... 3. C. petiolata.

1. **Campanula uniflora** L. Sp. Pl. 163. 1753.

Alpine belt; Uintah Mountains. Arctic regions to Colorado and Utah; also in Europe and Asia.

2. **Campanula parryi** A. Gray, Syn. Fl. ed. 2. 2[1]: 395. 1886.

Aspen, spruce, and subalpine belts. Wyoming and Utah to New Mexico and Arizona.

3. **Campanula petiolata** A. DC. Monogr. Campan. 278. 1830.

Aspen, spruce, and subalpine belts. Mackenzie to British Columbia, southward to New Mexico and western California.

3. SPECULARIA Heist. VENUS LOOKINGGLASS

1. **Specularia perfoliata** (L.) A. DC. Monogr. Campan. 351. 1830.

Campanula perfoliata L. Sp. Pl. 169. 1753.

Artemisia belt, upward to the spruce belt. Maine to Florida, westward to British Columbia and Oregon; also in Mexico.

127. LOBELIACEAE. Lobelia Family

Annual or perennial herbs; leaves simple, alternate, estipulate; inflorescence racemose; flowers perfect, 5-merous; calyx tube more or less adnate to the ovary, the lobes persistent; corolla irregular, epigynous; ovary 2-celled with axillary placentae or 1-celled with parietal placentae; style 1; stigma 2-lobed; fruit a many-seeded capsule.

Plants (our species) 30 cm. high or more; corolla red, 2 cm. long, the upper lobe 2-cleft. Leaves lanceolate to linear ---------- 2. LOBELIA.

Plants 20 cm. high or less; flowers not red.

Branchlets and peduncles filiform. Leaves small, obovate, basal; calyx very small, campanulate, partly free; upper lip of the corolla 2-lobed, the lower 3-lobed ---------- 1. NEMACLADUS.

Branchlets and peduncles not filiform.

Calyx tube turbinate or oblong; corolla blue, 2-lipped, the lower lip with 3 cuneate-obovate lobes, the upper 2-parted; leaves linear-lanceolate, entire. ---------- 3. PORTERELLA.

Calyx tube long-linear; corolla 2-lipped, the tube very short, the lower lip broad, 3-lobed, the upper with 2 narrow distinct lobes; leaves small, entire, sessile ---------- 4. DOWNINGIA.

1. NEMACLADUS Nutt.

1. **Nemacladus ramosissimus** Nutt. Trans. Amer. Phil. Soc. n. ser. 8: 254. 1843.

Plains and foothills of the Covillea belt. Southern Nevada, Arizona, and southern California.

2. LOBELIA L. LOBELIA

1. **Lobelia splendens** Willd. Hort. Berol. *pl. 86.* 1816.

Wet ground of the artemisia belt. Texas to California and Mexico.

3. PORTERELLA Torr.

1. **Porterella carnosula** (Hook. & Arn.) Torr. in Hayd. Rep. U. S. Geol. Surv. Montana 488. 1872.

Lobelia carnosula Hook. & Arn. Bot. Beechey Voy. 362. 1840.

Borders of ponds and in wet places of the artemisia belt; Nevada. Wyoming to California.

4. DOWNINGIA Torr.

Corolla almost white, exceeded by or equaling the calyx_____1. D. laeta.
Corolla blue with white center, exceeding the calyx_____2. D. pulchella.

1. **Downingia laeta** Greene, Leaflets 2: 45. 1910.
Wet meadows of the artemisia and pinyon belts. Nevada.

2. **Downingia pulchella** (Lindl.) Torr. U. S. Rep. Expl. Miss. Pacif. 4: 116. 1857.
Clintonia pulchella Lindl. Bot. Reg. 22: *pl. 1909*. 1836.
Wet meadows of the artemisia belt. Oregon, California, and northern Nevada.

128. ASTERACEAE. Aster Family

(Contributed by S. F. Blake)

Flowers in a head, on a receptacle, surrounded by an involucre; ovary inferior, 1-celled, containing 1 erect anatropous ovule, forming an achene in fruit, with an erect exalbuminous seed; calyx obsolete or represented merely by bristles or scales on the apex of the ovary, forming the pappus in fruit; corolla gamopetalous, of 5 (very rarely 4, in the ray flowers often only 2 or 3) petals, tubular or strap-shaped; stamens of the same number as the petals and alternate with them, inserted on the corolla, united by their anthers (or these very rarely free).

The largest of plant families, sometimes divided into three (*Carduaceae, Ambrosiaceae, Cichoriaceae*), but these groups are so closely related and have so many important characters in common that the family is better retained in its entirety. The tubular hermaphrodite flowers, when present, compose the disk; the strap-shaped corollas are known as rays or ligules. Heads composed of tubular hermaphrodite or filiform pistillate flowers only are described as discoid; those with the outer flowers pistillate but not provided with rays, as disciform; those with the outer flowers provided with rays, the inner tubular, as radiate; those with all the flowers strap-shaped and hermaphrodite, as ligulate. Rays in which the style is absent are called neutral; those in which it is present are called pistillate. The leaves of the involucre are called phyllaries or bracts. The scales which often occur on the receptacle at the base of the individual flowers are called pales (or chaff); when these are absent, the receptacle is usually naked, sometimes hairy, bristly, or fimbrillate. The generic characters are drawn to a considerable extent from the character of the pappus, which may be of bristles, awns, scales, or teeth, or reduced to a crown or cup, or entirely wanting.

All the flowers of the head hermaphrodite, with strap-shaped 5-toothed corollas. **A** (p. 522).

All the hermaphrodite flowers of the head with tubular corollas, the marginal often pistillate or neutral and with 2 or 3-toothed strap-shaped corollas.

Rays present.
Pappus of capillary bristles, rarely with a few short outer squamellae. **B** (p. 523.)

Pappus of awns or scales, or none.
Pappus none_____**C** (p. 524).
Pappus present_____**D** (p. 525).

Rays none.
Pappus none or vistigial_____**E** (p. 527).

Pappus evident.
Pappus of awns or squamellae, these sometimes united into a low paleaceous crown_____F (p. 528).
Pappus of capillary bristles, rarely with additional outer squamellae. G (p. 529).

A. Flowers all hermaphrodite, with strap-shaped 5-toothed corollas.
Pappus none_____**92. ATRICHOSERIS.**
Pappus present.
Pappus bristles plumose.
Involucre strongly graduated, of thin, very obtuse, broadly scarious-margined phyllaries; receptacle paleaceous_____**94. ANISOCOMA.**
Involucre obscurely if at all graduated, but often with a calyculus at base, its phyllaries herbaceous or only narrowly scarious-margined; receptacle naked.
Achenes truncate at apex.
Flowers yellow; plants with fusiform roots_____**93. MICROSERIS.**
Flowers pink or rosy; plants rushlike, not with fusiform roots. **95. PTILORIA.**
Achenes beaked.
Involucre calyculate; much-branched annuals with white or rosy flowers and pinnatifid leaves_____**97. NEMOSERIS.**
Involucre not calyculate; nearly simple perennials with yellow or purple flowers and entire grasslike leaves_____**98. TRAGOPOGON.**
Pappus bristles or awns not plumose.
Pappus of awns or scarious paleae.
Pappus of linear-lanceolate scarious paleae without lateral bristles; flowers yellow_____**93. MICROSERIS.**
Pappus of rigid awns, each bearing several shorter rigid bristles at base; flowers rosy_____**96. CHAETADELPHA.**
Pappus of capillary bristles.
Achenes more or less flattened; leafy-stemmed herbs with paniculate heads.
Achenes truncate at apex; involucre campanulate or hemispheric. **103. SONCHUS.**
Achenes beaked; involucre cylindric or ovoid-cylindric. **104. LACTUCA.**
Achenes not flattened; plants often scapose.
Achenes distinctly beaked.
Pappus quickly deciduous.
Leaves without crustaceous margin; achenes gradually narrowed into the beak, not cancellate-sculptured. **100. CALYCOSERIS.**
Leaves with narrow whitish crustaceous margin; achenes abruptly narrowed into a beak, the body cancellate-sculptured. **101. GLYPTOPLEURA.**
Pappus persistent.
Achenes 4 or 5-ribbed, spinulose-muricate above; involucre of an inner series of equal phyllaries and a distinct calyculus of numerous bractlets_____**102. LEONTODON.**
Achenes 10-ribbed or 10-nerved, not spinulose-muricate; involucre more or less gradually imbricate.
Involucre and pedicels not glandular-hispidulous. **106. AGOSERIS.**
Involucre and pedicels glandular-hispidulous_____**107. CREPIS.**

Achenes not beaked.
Pappus quickly deciduous, a few stiff outer bristles sometimes persistent.
Plants erect annuals; achenes without apical disk.
99. MALACOTHRIX.
Plants depressed, glabrous and glaucescent perennials; achenes bearing a slight disk at apex----------**107. CREPIS.**
Pappus persistent.
Flowers pink or rosy; plants rushlike or spinescent, a single species annual----------**105. LYGODESMIA.**
Flowers yellow, rarely white; perennial herbs, not rushlike or spinescent.
Pappus white; phyllaries in fruit somewhat thickened at base or on midrib----------**107. CREPIS.**
Pappus sordid; phyllaries not thickened at base or on midrib.
108. HIERACIUM.

B. Hermaphrodite flowers tubular; rays present; pappus of capillary bristles, rarely with a few short outer squamellae.
Rays white, pink, violet, or purple, not yellow.
Pappus of a single subplumose bristle and a short scarious cup, or of numerous unequal bristles, the outer more or less paleaceous; depressed winter annuals; involucre equal----------**13. MONOPTILON.**
Pappus of numerous capillary bristles, the outer rarely setulose; plants usually perennial; involucre often graduated.
Involucre usually strongly graduated; rays usually comparatively broad; style tips ovate and acute to subulate, usually lanceolate--**15. ASTER.**
Involucre subequal, rarely somewhat graduated; rays usually narrow; style tips very short, triangular, rounded or obtuse--**16. ERIGERON.**
Rays yellow, rarely orange-yellow.
Leaves opposite, at least on the lower part of the stem.
Plants undershrubs----------**53. LAPHAMIA.**
Plants herbs.
Involucre and leaves with conspicuous oil glands; leaves with stiff marginal bristles----------**72. PECTIS.**
Involucre and leaves without oil glands; leaves without stiff marginal bristles----------**82. ARNICA.**
Leaves all alternate.
Pappus of 2 to 8 stiff, quickly deciduous bristles. Glutinous herbs.
4. GRINDELIA.
Pappus persistent, usually soft, of numerous bristles.
Pappus of about 20 tortuous flattish bristles----**6. AMPHIPAPPUS.**
Pappus of numerous straight capillary bristles, the outer sometimes squamellate.
Pappus double, the inner of numerous bristles, the outer squamellate or of minute bristles.
Leaves not filiform----------**9. CHRYSOPSIS.**
Leaves essentially filiform----------**16. ERIGERON.**
Pappus not double, of subequal capillary bristles only.
Phyllaries in distinct vertical ranks.
Outer phyllaries not with loose herbaceous tips--**10. SOLIDAGO.**
Outer phyllaries with loose herbaceous tips.
12. CHRYSOTHAMNUS.

Phyllaries not in distinct vertical ranks.
Involucre 1-seriate, calyculate at base; style branches with truncate tips----------86. SENECIO.
Involucre not 1-seriate and calyculate; style branches not with truncate tips.
Heads small (except in *S. parryi*), usually very numerous and densely paniculate, rarely racemose or corymbed; phyllaries without distinct herbaceous tips (except in *S. parryi*).
10. SOLIDAGO.
Heads medium or large, neither very numerous nor densely paniculate----------11. APLOPAPPUS.

C. Hermaphrodite flowers tubular; rays present; pappus none.

Rays white; phyllaries with scarious margins.
Receptacle naked; leaves entire to pinnatifid----76. CHRYSANTHEMUM.
Receptacle paleaceous, at least toward summit; leaves bipinnatifid or tripinnatifid, with fine ultimate lobes.
Plant annual; heads comparatively large, scattered, pedunculate.
73. ANTHEMIS.
Plants perennial; heads small, in a terminal, close, flattish or rounded panicle----------74. ACHILLEA.
Rays yellow, rarely purplish.
Receptacle without pales.
Rays persistent, becoming papery; plants floccose-tomentose.
52. BAILEYA.
Rays not persistent and papery; plants not floccose-tomentose.
Rays conspicuous; phyllaries acuminate, without scarious margins.
64. BAHIA.
Rays minute; phyllaries obtuse, with scarious margins.
77. TANACETUM.
Receptacle paleaceous, at least toward the margin.
Ray achenes partly or wholly enfolded and enclosed by their phyllaries; plants annual, glandular-viscid above.
Ray achenes strongly compressed laterally, with narrow outer edges.
46. MADIA.
Ray achenes thick, not laterally compressed.
Disk flower solitary; leaves chiefly opposite----47. HEMIZONELLA.
Disk flowers 5 to many; leaves chiefly alternate.
Leaves laciniate-lobed or toothed, the teeth spinescent-tipped; pales pungent-tipped----------48. HEMIZONIA.
Leaves entire, not spinescent-tipped; pales not pungent-tipped.
49. LAGOPHYLLA.
Ray achenes not conspicuously enclosed or enfolded by their phyllaries; perennials or shrubby, if rarely annual not glandular above.
Rays pistillate, fertile; plants low, subscapose, perennial, with thick balsamic roots----------34. BALSAMORHIZA.
Rays neutral; plants not subscapose nor with thick balsamic roots.
Inner phyllaries united to middle into a cup----42. THELESPERMA.
Inner phyllaries not united to middle into a cup.
Achenes thickish, not margined----------36. VIGUIERA.
Achenes very flat, with very narrow white margins--38. ENCELIA.

D. Hermaphrodite flowers tubular; rays present; pappus present, of awns or scales.

Receptacle paleaceous throughout (in *Layia* usually only toward margin).
Receptacle bearing a row of pales between the ray flowers and the outer disk flowers, otherwise naked; pappus of 10 to 20 slender white paleae.
50. LAYIA.

Receptacle paleaceous throughout; pappus otherwise.
Pappus of awns only, without squamellae.
Ray corollas persistent, indurate——**32. ZINNIA.**
Ray corollas not persistent and indurate.
Achenes flat and obcompressed, rarely quadrangular or subterete; awns retrorsely hispid——**43. BIDENS.**
Achenes not obcompressed; awns not retrorsely hispid.
Pappus of numerous subequal lacerate-fimbriate awns.
45. BLEPHARIPAPPUS.

Pappus awns 1 or 2.
Achenes plump; pappus of 2 caducous paleaceous awns.
37. HELIANTHUS.

Achenes flat, very strongly compressed.
Plants scapose, with large solitary heads——**40. ENCELIOPSIS.**
Plants leafy-stemmed; heads medium-sized, usually several.
Plants shrubby; achenes narrowly white-margined, the margin not continuous between the weak awns——**38. ENCELIA.**
Plants annual; achenes strongly white-margined, the margin continuous between the stout awns——**39. GERAEA.**

Pappus at least in part of squamellae.
Achenes very flat, strongly compressed.
Plants scapose——**40. ENCELIOPSIS.**
Plants leafy-stemmed——**41. HELIANTHELLA.**
Achenes thickened.
Pappus caducous, of 2 paleaceous awns and rarely a few squamellae.
37. HELIANTHUS.

Pappus persistent.
Plant a shrub; two awns always present in pappus.
36. VIGUIERA.

Plants herbaceous perennials, or lignescent at base.
Inner phyllaries united to middle into a cup.
42. THELESPERMA.

Inner phyllaries not united into a cup.
Receptacle conic; rays neutral——**33. RUDBECKIA.**
Receptacle merely convex; rays pistillate——**35. WYETHIA.**

Receptacle not paleaceous, either naked or rarely bristly or fimbrillate.
Rays white or purple.
Pappus a short crown——**76. CHRYSANTHEMUM.**
Pappus of awns or squamellae.
Pappus of a single awn and a denticulate crown.
13. MONOPTILON.

Pappus of 2 or several awns or squamellae.
Plants dwarf woolly annuals.
Pappus of 2 broad aristate-tipped squamellae.
54. EATONELLA.

Pappus of 5 obtuse squamellae and 5 linear-lanceolate awns.
60. ERIOPHYLLUM.

Plants annuals or perennials, not woolly.
Pappus of numerous awns or squamellae; phyllaries conspicuously scarious-margined----------14. TOWNSENDIA.
Pappus of 4 or 5 stiff awns; phyllaries obscurely scarious-margined----------61. RIGIOPAPPUS.
Rays yellow, sometimes purplish-tinged.
Receptacle densely bristly or fimbrillate.
Heads very small, with 12 flowers or less----------7. GUTIERREZIA.
Heads medium-sized, with more than 12 flowers.
Pappus of 15 to 18 awns and as many shorter bristles or awns.
8. ACAMPTOPAPPUS.
Pappus of 5 to 10 often aristate paleae----------69. GAILLARDIA.
Receptacle naked.
Pappus a mere crown, or of caducous awns.
Pappus of 2 to 8 caducous awns----------4. GRINDELIA.
Pappus a short crown.
Leaves entire, bristly-margined----------72. PECTIS.
Leaves bipinnatifid or tripinnatifid----------77. TANACETUM.
Pappus persistent, of awns or squamellae.
Pappus of 1 or 2 awns or squamellae, with or without a low paleaceous crown.
Pappus of a single awn, without a paleaceous crown.
53. LAPHAMIA.
Pappus of 2 squamellae, or of 1 or 2 awns and a paleaceous crown.
Pappus of 2 ovate aristate-tipped squamellae.
54. EATONELLA.
Pappus of 1 or 2 awns and a paleaceous crown----------72. PECTIS.
Pappus of 4 to many awns or squamellae.
Pappus of about 20 slender tortuous awns; rays 1 or 2, small.
6. AMPHIPAPPUS.
Pappus of 4 to 16 tortuous awns or squamellae; rays usually several.
Pappus of 4 or 5 stiff, narrowly linear-lanceolate awns; achenes linear, transversely rugulose----------61. RIGIOPAPPUS.
Pappus of squamellae or of hyaline or setose-dissected awns.
Pappus of several scales dissected nearly to base; dwarf woolly annual----------56. SYNTRICHOPAPPUS.
Pappus awns or squamellae not dissected, or else plants perennial or frutescent.
Pappus of several more or less united squamellae; rays broad, papery-persistent----------51. PSILOSTROPHE.
Pappus not of united squamellae; rays not papery-persistent (except in No. 67).
Leaves and involucre with conspicuous oil glands.
70. DYSSODIA.
Leaves and involucre without conspicuous oil glands.
Plants viscid-glandular, at least above; leaves toothed or lyrate-lobed----------65. HULSEA.
Plants not viscid-glandular, or else leaves entire.
Achenes slender, elongate-clavate or linear-obpyramidal.
Plants woolly----------60. ERIOPHYLLUM.
Plants not woolly----------64. BAHIA
Achenes stouter, oblong or obovoid to turbinate.
Phyllaries spreading or reflexed--68. HELENIUM

Phyllaries appressed.
Pappus of numerous squamellae; stems leafy; leaves linear or linear-spatulate, entire, 2.5 mm. wide or less_____7. **GUTIERREZIA.**
Pappus of about 5 squamellae; leaves lobed or, if entire, broader and chiefly or entirely basal_____67. **ACTINEA.**

E. Hermaphrodite flowers tubular; rays none, the pistillate flowers, if present, with corolla filiform, annular, or wanting; pappus none or vestigial.

Heads unisexual, monoecious; the pistillate heads with 1 to 4 flowers enclosed in a nutlike or burlike involucre, only the style tips exserted.
Involucre of the staminate heads of free phyllaries; fruiting pistillate involucres burlike, covered with hooked prickles_____31. **XANTHIUM.**
Involucre of the staminate heads of united phyllaries.
Pistillate involucre fusiform, with a series of spiral transverse orbicular scarious wings; leaves or their lobes linear-filiform.
28. HYMENOCLEA.
Pistillate involucre without transverse scarious wings; leaves and their lobes not linear-filiform.
Pistillate involucre unarmed or with 4 to 6 teeth or tubercles below the beak, in a single series_____29. **AMBROSIA.**
Pistillate involucre bearing numerous spines in more than one series.
30. FRANSERIA.

Heads not unisexual; involucre not nutlike or burlike.
Flowers of the head all hermaphrodite.
Receptacle paleaceous throughout; achenes flat, very strongly laterally compressed_____38. **ENCELIA.**
Receptacle naked or merely hairy.
Heads spicate, racemose, or panicled_____79. **ARTEMISIA.**
Heads solitary at tips of branches and branchlets, or in corymbose panicles.
Plants hirtellous undershrubs with entire or slightly toothed leaves.
53. LAPHAMIA.
Plants herbs, not hirtellous; leaves crenate to tripinnatifid.
Leaves bipinnatifid to tripinnatifid, green; receptacle conic.
75. MATRICARIA.
Leaves crenate, with a pair of small lobes at base, grayish-pubescent; receptacle low_____76. **CHRYSANTHEMUM.**
Flowers not all hermaphrodite, the outer pistillate, fertile, the inner hermaphrodite, usually sterile.
Plant a woolly annual; achenes of the pistillate flowers enveloped by the phyllaries, the latter with woolly base and hyaline tip.
20. STYLOCLINE.
Plants not woolly (except in one shrubby species); phyllaries not woolly at base and with hyaline tip.
Receptacle paleaceous.
Achenes very villous; leaves or their lobes linear-filiform.
26. OXYTENIA.
Achenes not villous; leaves or their lobes not linear-filiform.
Achenes obovoid or pyriform, not winged_____25. **IVA.**
Achenes flattened, pectinate-winged_____27. **DICORIA.**
Receptacle naked or merely hairy.
Achenes obcompressed, margined; outer flowers pistillate but without corollas_____78. **COTULA.**

Achenes not obcompressed and margined; outer flowers pistillate, with corollas.
Heads corymbosely arranged, few or many_____77. **TANACETUM.**
Heads spicate, racemose, or panicled, usually very numerous.
79. ARTEMISIA.

F. Hermaphrodite flowers tubular; rays none; pappus of awns or squamellae, these sometimes united into a low paleaceous crown.
Receptacle paleaceous.
Pappus of about 15 long awns, sometimes with as many shorter outer awns or bristles.
Pappus of about 15 awns and as many shorter awns or bristles, not plumose_____8. **ACAMPTOPAPPUS.**
Pappus of about 15 plumose awns_____44. **BEBBIA.**
Pappus of 1 to 4 awns or teeth, or a low crown.
Pappus of retrorsely barbed awns or teeth.
Inner phyllaries united to middle into a cup____42. **THELESPERMA.**
Inner phyllaries not united into a cup_____43. **BIDENS.**
Pappus not of retrorsely barbed awns or teeth.
Achenes quadrangular, plump; pappus a low paleaceous crown, without awns_____33. **RUDBECKIA.**
Achenes flat, strongly compressed; paleaceous crown of pappus, if present, accompanied by awns.
Plants frutescent, leafy-stemmed; pappus of 1 or 2 weak awns.
38. ENCELIA.
Plants scapose perennial herbs; pappus of 2 teeth or awns and a crown of sometimes united squamellae_____40. **ENCELIOPSIS.**
Receptacle naked or merely setose or fimbrillate.
Heads 1-flowered, capitate-clustered and surrounded by spiny-toothed foliaceous bracts_____91. **HECASTOCLEIS.**
Heads many-flowered, not capitate-clustered.
Receptacle densely setose_____90. **CENTAUREA.**
Receptacle not densely setose, naked or rarely fimbrillate or sparsely setose.
Pappus of 2 to 8 caducous awns_____4. **GRINDELIA.**
Pappus not of 2 to 8 caducous awns.
Pappus of very numerous awns; low shrub with very crowded entire subterete impressed-punctate leaves__84. **PEUCEPHYLLUM.**
Pappus awns 18 or less; plants, if shrubby, not with crowded subterete impressed-punctate leaves.
Pappus of 15 to 18 awns and as many shorter outer awns or bristles._____8. **ACAMPTOPAPPUS.**
Pappus otherwise.
Pappus of 5 deeply setose-dissected awns__66. **TRICHOPTILIUM.**
Pappus awns not setose-dissected.
Pappus of about 18 plumose awns_____80. **RAILLARDELLA.**
Pappus awns or squamellae not plumose.
Pappus of a single awn. Low hirtellous undershrubs.
53. LAPHAMIA.
Pappus of 4 to 16 awns or squamellae.
Pappus of 12 to 16 linear, acute or acuminate awns or paleae.
Involucre turbinate, the phyllaries viscid, squarrose; plant frutescent; flowers yellow. **5. VANCLEVEA.**

Involucre not turbinate, the phyllaries not viscid and squarrose; plants herbaceous; flowers white or flesh-colored.

Pappus of linear aristate-tipped awns; phyllaries with conspicuous scarious margins.

58. HYMENOTHRIX.

Pappus of hyaline awns or squamellae; phyllaries herbaceous_____**62. CHAENACTIS.**

Pappus awns or squamellae fewer than 12, or else obtuse.

Achenes flattened, strongly hispid-ciliate on the callous margin; leaves opposite, at least below.

55. PERICOME.

Achenes not flattened and hispid-ciliate or callous-margined; leaves mostly alternate.

Pappus of 4 or 5 stiff linear-lanceolate awns; achenes transversely rugulose; slender annual.

61. RIGIOPAPPUS.

Pappus of hyaline or scarious squamellae or paleae; achenes not transversely rugulose; plants usually perennial.

Pappus of 4 linear scarious-margined squamellae; heads about 2 cm. high; hispid annual.

59. PALAFOXIA.

Pappus squamellae usually 5 to 16; heads much less than 2 cm. high; plants usually perennial.

Pappus of about 5 connate squamellae; outer flowers pistillate; dwarf silvery-canescent perennial_____**77. TANACETUM.**

Pappus squamellae usually more than 5; outer flowers not pistillate; plants usually woolly.

Low scapose perennial with suborbicular or oval entire leaves; pappus squamellae hyaline, with distinct midrib.

63. CHAMAECHAENACTIS.

Plants usually leafy-stemmed, never with suborbicular or oval, entire leaves.

Phyllaries with conspicuous scarious white or colored margins__**57. HYMENOPAPPUS.**

Phyllaries not with conspicuous scarious colored margins.

Heads yellow; phyllaries thin-margined, partly enclosing the ray achenes.

60. ERIOPHYLLUM.

Heads whitish or flesh-colored; phyllaries not thin-margined or partly enclosing the ray achenes_____**62. CHAENACTIS.**

G. Hermaphrodite flowers tubular; rays none; pappus of capillary bristles. rarely with additional outer squamellae.

Receptacle densely setose.

Pappus bristles very slender, plumose, united at base and deciduous in a ring_____**88. CIRSIUM.**

Pappus bristles not plumose (except rarely the innermost), not united at base and deciduous in a ring.
Phyllaries with hooked tips; leaves large, broadly cordate--87. **ARCTIUM.**
Phyllaries sometimes spiny but not with hooked tips; leaves not large and broadly cordate----------90. **CENTAUREA.**
Receptacle naked or paleaceous, not densely setose.
Leaves very large, spiny-toothed; heads about 5 cm. wide. A coarse biennial. **89. ONOPORDON.**
Leaves, if spiny-toothed, small; heads very much smaller.
Phyllaries dry and scarious or hyaline.
Heads unisexual, dioecious.
Plants perennial herbs or shrubs, not tomentose----18. **BACCHARIS.**
Plants tomentose herbs.
Heads strictly dioecious; plants usually low, with tufts of basal leaves and stolons, the stem leaves usually reduced. **22. ANTENNARIA.**
Female heads usually with a few hermaphrodite flowers in the center; herb about 40 cm. high, leafy-stemmed, without stolons or tufts of basal leaves----------23. **ANAPHALIS.**
Heads with numerous marginal pistillate flowers and few or many central hermaphrodite flowers.
Receptacle paleaceous except in the center----------21. **FILAGO.**
Receptacle naked.
Phyllaries dry, scarcely scarious; plants not tomentose. **19. PLUCHEA.**
Phyllaries scarious; plants tomentose.
Heads subdioecious, the pistillate with a few hermaphrodite sterile flowers in the center----------23. **ANAPHALIS.**
Heads with pistillate outer flowers and hermaphrodite central ones, all fertile----------24. **GNAPHALIUM.**
Phyllaries sometimes dry but not scarious or hyaline.
Heads unisexual, dioecious----------18. **BACCHARIS.**
Heads not unisexual.
Plants low depressed scurfy-pubescent winter annuals; leaves broadly ovate or roundish, entire or toothed--------83. **PSATHYROTES.**
Plants perennial, or if annual not low and scurfy-pubescent.
Phyllaries 5, marked with conspicuous linear glands; glaucous and glabrous undershrub----------71. **POROPHYLLUM.**
Phyllaries nearly always more than 5, never marked with linear glands.
Phyllaries 4 to 6, in a single equal series. Tomentose shrubs. **85. TETRADYMIA.**
Phyllaries more numerous, usually unequal and graduated.
Leaves opposite, at least below; involucre 2-seriate, the phyllaries subequal, without calyculus; flowers yellow. **82. ARNICA.**
Læaves alternate, or else flowers not yellow.
Plants rigid broomlike shrubs; leaves, at least on the branches, scalelike, minute; involucre of strongly graduated scarious-chartaceous phyllaries------81. **LEPIDOSPARTUM.**
Plants not rigid, broomlike, and with scalelike leaves, or else phyllaries in very distinct rows and strongly keeled.

Plant a shrub with densely crowded subterete impressed-punctate leaves; involucre nearly 1-seriate, equal, the phyllaries subulate, herbaceous.

84. PEUCEPHYLLUM.

Plants herbaceous, or if shrubby and with subterete impressed-punctate leaves, then phyllaries not equal, subulate, and herbaceous.

Pappus double, the inner of several capillary bristles, the outer of short paleae; white-barked shrub with small leaves, the petioles much longer than the blades.

1. HOFMEISTERIA.

Pappus simple, or else plants herbaceous.

Outer flowers of the head pistillate, with tubular-filiform corollas; hermaphrodite flowers few in center of head.

Involucre subequal_____**17. ESCHENBACHIA.**

Involucre distinctly graduate_____**19. PLUCHEA.**

Outer flowers of the head like the others, hermaphrodite, with tubular corollas.

Phyllaries equal, in a single series, calyculate at base; style tips truncate_____**86. SENECIO.**

Phyllaries usually graduated; style tips not truncate.

Achenes distinctly 5-ribbed; leaves opposite or whorled; flowers white or purple.

2. EUPATORIUM.

Achenes not 5-ribbed, or else flowers yellow; leaves often alternate.

Pappus of 2 to 8 deciduous awnlike bristles.

4. GRINDELIA.

Pappus of numerous bristles.

Achenes distinctly 10-ribbed; flowers white, ochroleucous, or pink.

3. COLEOSANTHUS.

Achenes not 10-ribbed; flowers usually yellow.

Pappus double, the inner of bristles, the outer of short, sometimes inconspicuous squamellae or bristles; disk permanently golden yellow_____**9. CHRYSOPSIS.**

Pappus simple or, if double, the disk not permanently golden yellow.

Phyllaries arranged in more or less distinct vertical ranks.

12. CHRYSOTHAMNUS.

Phyllaries not in vertical ranks.

Plant glaucous and glabrous, much branched, with very numerous heads; leaves of the branches subulate, scalelike_____**15. ASTER.**

Plants not glabrous and glaucous and with very numerous heads or, if so, branch leaves not subulate and scalelike.

Plants shrubby or, if herbaceous, the leaves spinulose-toothed, or else involucre strongly imbricated.
11. APLOPAPPUS.

Plants herbaceous; leaves not spinulose-toothed; involucre subequal or slightly imbricate.
16. ERIGERON.

1. HOFMEISTERIA Walp.

1. Hofmeisteria pluriseta A. Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 96. *pl. 9.* 1857.

Hofmeisteria viscosa A. Nels. Bot. Gaz. **37**: 263. 1904.

Dry canyons and desert areas of the Covillea belt. Utah and Nevada to Lower California and Arizona.

2. EUPATORIUM L. EUPATORIUM

Leaves verticillate, in 3's or 4's, ovate or ovate-oblong, 7 cm. long or more, coarsely serrate, finely grayish-pilosulous or tomentose beneath; involucre 7 to 8 mm. high, strongly graduated; flowers purple, in flat-topped corymbs.
1. E. bruneri.

Leaves alternate or opposite (rarely verticillate), 4 to 10 cm. long, green beneath; involucre 3 to 4 mm. high, the phyllaries subequal; flowers white or tinged with purple.

Leaves mostly alternate, ovate, at base rounded, truncate, or rarely cordate, sparingly dentate to entire; heads 8 to 10 mm. high; achenes merely glandular-puberulent ..... **2. E. occidentale.**

Leaves opposite (occasionally verticillate), ovate, commonly cordate, crenate-serrate; heads 6 to 8 mm. high; achenes hispidulous.
3. E. herbaceum.

1. Eupatorium bruneri A. Gray, Syn. Fl. 1^2: 96. 1884.

Wet meadows and along creeks of the artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, southward to Utah.

2. Eupatorium occidentale Hook. Fl. Bor. Amer. **1**: 305. 1834.

Foothills and canyons, upward to the aspen belt. Idaho and Washington, southward to Utah and California.

3. Eupatorium herbaceum (A. Gray) Greene, Pittonia **4**: 279. 1901.

Eupatorium ageratifolium herbaceum A. Gray, Pl. Wright. **2**: 74. 1853.

Eupatorium occidentale arizonicum A. Gray, Syn. Fl. 1^2: 101. 1884.

Eupatorium arizonicum Greene, Pittonia **4**: 280. 1901.

Canyons and mountain sides, upward to the spruce belt. New Mexico, westward to Utah.

3. COLEOSANTHUS Cass.

Heads very large, about 22 mm. high, solitary at tips of branches. Leaves subsessile, ovate, gray-tomentose, about 1 cm. long ..... **12. C. incanus.**

Heads medium or small, 17 mm. high or less.

Leaves very narrowly lanceolate to ovate-lanceolate; heads 3 to 5-flowered.

Leaves linear-lanceolate ..... **1. C. longifolius.**

Leaves ovate-lanceolate ..... **2. C. multiflorus.**

Leaves deltoid-ovate to elliptic or spatulate; heads 10 to 60-flowered.

Phyllaries linear to linear-oblong, not herbaceous.

Petioles usually very short.

Leaves triangular-ovate to ovate, more or less toothed.
Involucre glabrous or essentially so_____3. C. californicus.
Involucre puberulous or glandular.
Involucre puberulous; leaves densely grayish-tomentellous, 3 to 9 mm. long and wide_____4. C. desertorum.
Involucre glandular or hispidulous; leaves green.
Stem glandular-villous; achenes 4 to 4.5 mm. long. 5. C. microphyllus.
Stem lanulose or glandular-puberulous; achenes 3.5 mm. long.
Stem finely lanulose_____6. C. watsonii.
Stem glandular-puberulous_____7. C. scaber.
Leaves elliptic to spatulate, entire or subentire.
Leaves spatulate, 3 to 12 mm. long. Heads about 13 mm. high. 8. C. frutescens.
Leaves elliptic to lance-oblong, 1 to 3 cm. long.
Achenes more or less densely glandular_____9. C. oblongifolius.
Achenes hispidulous, the glands few or wanting. 9a. C. oblongifolius linifolius.
Petioles slender, half as long as the blades, 1 to 7 cm. long. Leaves thin, triangular, toothed_____10. C. grandiflorus.
Phyllaries broadly ovate, herbaceous. Leaves coriaceous, bright green, short-petioled, veiny; heads solitary at tips of branches, 15 mm. high. 11. C. atractyloides.

1. Coleosanthus longifolius (S. Wats.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia longifolia S. Wats. Amer. Nat. 7: 301. 1873.
Desert areas and dry canyons of the upper Covillea and artemisia belts. Utah and Arizona to eastern California.

2. Coleosanthus multiflorus (Kellogg) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia multiflora Kellogg, Proc. Calif. Acad. 7: 49. 1877.
Rocky canyons of the artemisia and pinyon belts; Soda Spring Canyon. Nevada and California.

3. Coleosanthus californicus (Torr. & Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Bulbostylis californica Torr. & Gray, Fl. N. Amer. 2: 79. 1841.
Brickellia tenera A. Gray, Pl. Wright. 2: 72. 1853.
Coleosanthus albicaulis Rydb. Bull. Torrey Club 31: 646. 1905.
Plains and foothills of the artemisia and pinyon belts. Colorado to California and Mexico.

4. Coleosanthus desertorum Colville, Contr. U. S. Nat. Herb. 4: 119. 1893.
Brickellia desertorum Coville, Proc. Biol. Soc. Washington 7: 68. 1892.
Desert areas and dry mountain slopes of the Covillea belt. Nevada to Arizona and southern California.

5. Coleosanthus microphyllus (Nutt.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Bulbostylis microphylla Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 286. 1840.
Desert areas and rocky hillsides of the artemisia and pinyon belts. Oregon to Utah and California.

6. Coleosanthus watsonii (Robinson) Rydb. Fl. Rocky Mount. 843. 1917.
Brickellia watsonii Robinson, Mem. Gray Herb. 1: 42. 1917.
Foothills of the artemisia and pinyon belts. Utah to southeastern California.

7. Coleosanthus scaber (A. Gray) Greene, Pittonia 3: 100. 1896.
Brickellia microphylla scabra A. Gray, Proc. Amer. Acad. 11: 74. 1876.
Plains, dry canyons, and foothills of the artemisia and pinyon belts. Wyoming to Arizona.

8. Coleosanthus frutescens (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia frutescens A. Gray, Proc. Amer. Acad. 17: 207. 1882.
Desert areas and dry hillsides of the Covillea belt. Nevada to California and Lower California.

9. Coleosanthus oblongifolius (Nutt.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia oblongifolia Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 288. 1840.
Brickellia oblongifolia abbreviata A. Gray, Syn. Fl. 1²: 104. 1884.
Foothills and canyons up to 1,800 meters. British Columbia to Utah and Nevada.

9a. Coleosanthus oblongifolius linifolius (D. C. Eaton) Blake.
Brickellia linifolia D. C. Eaton in King, Geol. Expl. 40th Par. 5: 137. *pl. 15, f. 1–6.* 1871.
Brickellia oblongifolia linifolia Robinson, Mem. Gray Herb. 1: 104. 1917.
Canyons, hillsides, and rocky places of the artemisia, pinyon, and yellow pine belts. Colorado to Arizona and California.

10. Coleosanthus grandiflorus (Hook.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Eupatorium ? grandiflorum Hook. Fl. Bor. Amer. 2: 26. 1834.
Brickellia grandiflora Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 287. 1840.
Coleosanthus garrettii A. Nels. Proc. Biol. Soc. Washington 20: 38. 1907.
Canyons and wooded mountain sides up to 2,700 meters. Missouri to Washington and California.

11. Coleosanthus atractyloides (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia atractyloides A. Gray, Proc. Amer. Acad. 8: 290. 1870.
Coleosanthus venulosus A. Nels. Bot. Gaz. 37: 262. 1904.
Desert areas and rocky canyons of the Covillea and artemisia belts. Utah, Nevada, and Arizona.

12. Coleosanthus incanus (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia incana A. Gray, Proc. Amer. Acad. 7: 350. 1868.
Desert areas in gravelly soil; Ash Meadows, at 600 to 900 meters. Nevada and California.

4. GRINDELIA Willd. GRINDELIA

Heads discoid ..... **1. G. fastigiata.**
Heads radiate.
  Leaves, at least the lower, irregularly incised or subpinnatifid.
    Phyllaries mostly appressed; disk 8 to 12 mm. thick; leaves narrow, laciniate with linear or linear-lanceolate lobes ..... **2. G. laciniata.**
    Phyllaries strongly reflexed or recurved; disk usually 12 to 18 mm. thick; leaves oblanceolate to linear-oblanceolate, sharply incised-serrate, the lobes triangular ..... **3. G. subincisa.**
  Leaves merely serrate or entire.
    Pappus awns barbellate ..... **4. G. subalpina.**
    Pappus awns essentially smooth.
      Phyllaries all with strongly recurved subterete tips ..... **5. G. squarrosa.**
      Phyllaries with loosely spreading or ascending but not recurved, flattish tips ..... **6. G. grandiflora.**

1. Grindelia fastigiata Greene, Pittonia 3: 102. 1896.
Grindelia aphanactis Rydb. Bull. Torrey Club 31: 647. 1904.
Along San Juan River, Utah, at 1,500 meters. Colorado, New Mexico, and eastern Utah.

2. Grindelia laciniata Rydb. Fl. Rocky Mount. 848. 1917.

Canyons and mountain meadows of the artemisia, pinyon, and yellow pine belts. Southeastern Utah.

3. Grindelia subincisa Greene, Pittonia **4:** 154. 1900.

Mountain parks and canyons of the yellow pine, aspen, and spruce belts. Colorado to Arizona.

4. Grindelia subalpina Greene, Pittonia **3:** 297. 1898.

Aspen and spruce belts. Montana to British Columbia, southward to New Mexico.

5. Grindelia squarrosa (Pursh) Dunal; DC. Prodr. **5:** 315. 1836.

Donia squarrosa Pursh, Fl. Amer. Sept. 559. 1814.

Grindelia serrulata Rydb. Bull. Torrey Club **31:** 646. 1904.

Plains and foothills of the artemisia, pinyon, and yellow pine belts. Saskatchewan to Kansas and Iowa, southward to Arizona.

6. Grindelia grandiflora Hook. in Curtis's Bot. Mag. **78:** *pl. 4628.* 1852.

Dry hills of the artemisia and pinyon belts. Texas to Nevada.

5. VANCLEVEA Greene

1. Vancleva stylosa (Eastw.) Greene, Pittonia **4:** 51. 1899.

Grindelia stylosa Eastw. Proc. Calif. Acad. II. **6:** 293. 1896.

Artemisia belt; Barton Range, southeastern Utah.

6. AMPHIPAPPUS Torr. & Gray

1. Amphipappus fremontii Torr. & Gray, Proc. Bost. Soc. Nat. Hist. **1:** 210. 1845.

Amphiachyris fremontii A. Gray, Proc. Amer. Acad. **8:** 633. 1873.

Desert areas and hillsides of the Covillea belt. Southern Utah, Nevada, and California.

7. GUTIERREZIA Lag. SNAKEWEED

Ray and disk flowers each 1 or 2; heads sessile, clustered, slender-cylindric, the involucre 2 to 2.8 mm. high ..... **4. G. lucida.**

Ray and disk flowers each 3 to 6; heads turbinate or obovoid.

Lower leaves mostly spatulate-linear, the upper linear, 1 to 1.8 mm. wide. **1. G. sarothrae.**

Leaves linear-filiform, less than 1 mm. wide.

Heads mostly in glomerules of 2 to 4 ..... **2. G. microcephala.**

Heads mostly solitary, slender-peduncled ..... **3. G. divaricata.**

1. Gutierrezia sarothrae (Pursh) Britt. & Rusby, Trans. N. Y. Acad. **7:** 10. 1887.

Solidago sarothrae Pursh, Fl. Amer. Sept. 540. 1814.

Gutierrezia euthamiae Torr. & Gray, Fl. N. Amer. **2:** 193. 1842.

Gutierrezia diversifolia Greene, Pittonia **4:** 53. 1899.

Gutierrezia longifolia Greene, Pittonia **4:** 54. 1899.

Gutierrezia tenuis Greene, Pittonia **4:** 55. 1899.

Gutierrezia linearis Rydb. Bull. Torrey Club **31:** 647. 1905.

Plains of the artemisia belt and in foothills and canyons upward to 2,700 meters. Saskatchewan to Kansas, westward to Utah and California.

2. Gutierrezia microcephala (DC.) A. Gray, Mem. Amer. Acad. n. ser. **4:** 74. 1849.

Brachyris microcephala DC. Prodr. **5:** 313. 1836.

Gutierrezia filifolia Greene, Pittonia **4:** 55. 1899.

Plains, foothills, and canyons of the artemisia, pinyon, yellow pine, and aspen belts. Idaho to New Mexico and Arizona.

3. Gutierrezia divaricata (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 194. 1842.
Brachyris divaricata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 313. 1840.
Plains and foothills of the artemisia, pinyon, and yellow pine belts. Wyoming to Texas and " Utah."

4. Gutierrezia lucida Greene, Fl. Franc. 361. 1897.
Xanthocephalum lucidum Greene, Pittonia **2**: 282. 1892.
Gutierrezia glomerella Greene, Pittonia **4**: 54. 1899.
Plains, slopes, and rocky canyons of the Covillea and artemisia belts. Texas to Colorado, Nevada, southern California, and northern Mexico.

8. ACAMPTOPAPPUS A. Gray

Stem and leaves densely and finely puberulous or hispidulous; leaves obovate to spatulate, 7 to 13 mm. long; heads solitary at the tips of branches, radiate----------1. **A. shockleyi.**
Stem glabrous; leaves linear or linear-spatulate to oblanceolate, spinulose-ciliolate, otherwise essentially glabrous, 8 to 27 mm. long; heads mostly 2 to 5 at tips of branches, discoid----------2. **A. sphaerocephalus.**

1. Acamptopappus shockleyi A. Gray, Proc. Amer. Acad. **17**: 208. 1882.
Desert areas and dry hillsides of the Covillea and lower artemisia belts. Nevada and California.

2. Acamptopappus sphaerocephalus (Harv. & Gray) A. Gray, Proc. Amer. Acad. **8**: 634. 1874.
Aplopappus sphaerocephalus Harv. & Gray; A. Gray, Mem. Amer. Acad. n. ser. **4**: 76. 1849.
Desert areas and stony hillsides of the Covillea and lower artemisia belts. Southern Utah to Arizona and California.

9. CHRYSOPSIS Ell. Golden-aster

Heads discoid; stem leaves ovate, clasping, 3-nerved. Involucre glandular, scarcely pubescent; disk flowers at maturity nearly twice as long as the involucre----------6. **C. breweri.**
Heads radiate; stem leaves lanceolate to obovate or oval, not clasping. Disk flowers at maturity equaling or slightly exceeding the involucre.
Involucre densely pubescent, the glands obscure; plants canescent or grayish green.
Plants cespitose, about 10 cm. high, densely matted. Leaves spatulate, densely and canescently hispid-pilose; heads small, not distinctly peduncled, subtended by leaflike bracts----------1. **C. jonesii.**
Plants erect, not cespitose.
Plants canescent; stem hispidulous and hispid with appressed, ascending, or spreading hairs; leaves elliptic to obovate, usually not distinctly petioled, subsericeous-canescent----------2. **C. foliosa.**
Plants grayish green, not canescent; stem appressed-hispidulous and more or less hispid with erect or spreading hairs; leaves usually spatulate or spatulate-obovate and distinctly petioled--3. **C. villosa.**
Involucre rather densely glandular, ciliolate toward the apex, otherwise essentially glabrous; plants usually green.
Heads not subtended by leaflike bracts.
Stems glandular, very sparsely hispid; leaves oblong-elliptic or obovate, green, glandular and sparsely hispid----------4. **C. viscida.**

Stems densely hispid as well as hispidulous; leaves grayish green, rather densely hispid----------**4a. C. viscida cinerascens.**

Heads subtended by leaflike bracts, equaling or exceeding the involucre.

Stems hispidulous-glandular and sparsely hispid.

Leaves spatulate or oblanceolate, hispidulous-glandular and more or less hispid, hispid-ciliate at least at base, 1 to 2 cm. long; bracts subtending involucre lanceolate, 1 to 2 mm. wide, glandular-hispidulous and hispid-ciliate; involucre glandular and hispidulous. **4b. C. viscida ciliata.**

Leaves oblong or elliptic to spatulate-obovate, mostly 2 to 5 cm. long; bracts subtending involucre usually elliptic or oval, mostly 2 to 5 mm. wide; involucre glandular and hispid-pilose----**5. C. fulcrata.**

1. Chrysopsis jonesii Blake, nom. nov.

Chrysopsis caespitosa Jones, Proc. Calif. Acad. II. **5**: 694. 1895. Not *C. caespitosa* Nutt. 1834.

Artemisia belt. Southern Utah.

2. Chrysopsis foliosa Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 316. 1840.

Chrysopsis mollis Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 316. 1840.

Chrysopsis villosa foliosa D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 164. 1871.

Chrysopsis hirsutissima Greene, Pittonia **4**: 153. 1900.

Chrysopsis imbricata A. Nels. Bot. Gaz. **37**: 263. 1904.

Plains and canyons of the artemisia and pinyon belts. Minnesota to Utah and Washington.

3. Chrysopsis villosa (Pursh) Nutt.; DC. Prodr. **5**: 327, 1836.

Amellus villosus Pursh, Fl. Amer. Sept. 564. 1814.

?*Chrysopsis villosa scabra* Eastw. Proc. Calif. Acad. II. **6**: 294. 1896.

Chrysopsis bakeri Greene, Pittonia **4**: 153. 1900.

Chrysopsis asprella Greene, Leaflets **1**: 150. 1905.

Chrysopis arida A. Nels. in Rydb. Colo. Agr. Exp. Sta. Bull. **100**: 340. 1906.

Chrysopsis butleri Rydb. Bull. Torrey Club **37**: 129. 1910.

Plains, mountain sides, and canyons of the artemisia belt, upward to 3,300 meters. Minnesota to Saskatchewan, southward to Texas and New Mexico.

4. Chrysopsis viscida (A. Gray) Greene, Erythea **2**: 105. 1894.

Chrysopsis villosa hispida (form) D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 164. 1871.

Chrysopsis villosa viscida A. Gray, Syn. Fl. 1^2: 123. 1884.

Plains and in canyons, upward to 2,700 meters. Colorado to Texas and Arizona.

4a. Chrysopsis viscida cinerascens Blake, Proc. Biol. Soc. Washington **35**: 173. 1922.

Pinyon, yellow pine, and aspen belts. Utah.

4b. Chrysopsis viscida ciliata (A. Nels.) Blake.

Chrysopsis resinolens ciliata A. Nels. Bot. Gaz. **28**: 233. 1901.

Canyons and mountain sides, upward to 3,000 meters. Wyoming to Utah.

5. Chrysopsis fulcrata Greene, Bull. Torrey Club **25**: 119. 1898.

Chrysopsis resinolens A. Nels. Bull. Torrey Club **28**: 232. 1901.

Aspen and spruce belts. Montana to Colorado, southward to Texas and New Mexico.

6. Chrysopsis breweri A. Gray, Proc. Amer. Acad. **6**: 542. 1865.

Artemisia belt, upward to 2,700 meters; Sierra Nevada. California and western Nevada.

10. SOLIDAGO L. Goldenrod

Heads corymbose, or panicled in corymbose clusters.
Heads large, 10 to 12 mm. high, usually few, corymbose; phyllaries with conspicuous herbaceous tips----------15. S. parryi.
Heads 8 mm. high or less, the phyllaries dry or with very short herbaceous tips.
Heads turbinate or turbinate-subglobose, about 5 mm. high; stems usually freely branched, up to 2 meters high; leaves linear, weakly 3-nerved. 13. S. occidentalis.
Heads slender-cylindric, 6 to 9 mm. high; stems simple below the inflorescence, 20 cm. high or less, with tufts of persistent, basal, spatulate-oblanceolate or linear-oblanceolate to linear, 3-nerved and reticulate leaves----------14. S. petradoria.
Heads racemose or very numerous and panicled, the inflorescence with usually racemiform branches. Involucre 6 mm. high or less.
Involucre 5 to 6 mm. high. Plant 30 cm. high or less; basal leaves oblanceolate or obovate-spatulate, acute or obtuse, crenate-serrate, green; the middle long-petiolate; inflorescence racemose or slightly branched; the heads few, mostly on pedicels 5 to 20 mm. long; phyllaries lanceolate to linear-lanceolate, acute to acuminate----------1. S. ciliosa.
Involucre 4 mm. high or less (rarely 5.5 mm. in *S. decumbens*, which has leaves not ciliate).
Stem glabrous or sparsely pubescent above; leaves subglabrous or pubescent merely on veins and margin, rarely sparsely pubescent on surface.
Leaves not uniform, the lower oblanceolate to spatulate-obovate, tapering into margined petioles, much larger than the upper; stem and branches of inflorescence glabrous; phyllaries firm, oblong, obtuse.
Involucre mostly 4 to 5.5 mm. high. Basal leaves obovate or spatulate, 10 cm. long or less; stems 10 to 40 cm. high; heads racemose or thyrsoid-panicled----------2. S. decumbens.
Involucre 2 to 3.5 mm. high.
Basal leaves oblanceolate or spatulate, crenate-serrate, 15 cm. long or less (including the short petiole), smooth; thyrse oblong, the branches sometimes spreading----------11. S. missouriensis.
Basal leaves oblanceolate or oblong-oblanceolate, entire, 15 to 30 cm. long (including the long petiole), rough-margined; heads in an oblong thyrse----------12. S. spectabilis.
Leaves nearly uniform, lanceolate, usually sharply serrate; stem (at least above) and branches of inflorescence puberulous; phyllaries linear or linear-lanceolate, thin.
Involucre 2 to 2.5 mm. high; leaves lanceolate, sharply serrate; branches of inflorescence usually strongly recurved-spreading; phyllaries linear or linear-lanceolate, mostly acuminate. 8. S. canadensis.
Involucre 3 to 3.5 mm. high; leaves lanceolate, often broadly so, serrate; panicle branches usually erect, forming a dense thyrse; phyllaries linear, usually obtuse or merely acute--10. S. elongata.
Stems densely cinereous-puberulent; leaves usually densely puberulous or pubescent on lower face.
Leaves mostly elliptic-lanceolate to lanceolate, the lower not elongate.
Phyllaries ovate, acute, densely puberulous. Leaves sessile or subsessile, mostly entire----------5. S. bigelovii.

Phyllaries lanceolate to linear-lanceolate, glabrous or merely ciliate.
Involucre 2 to 2.5 mm. high; leaves nearly uniform, lanceolate, triplinerved, serrate. Branches of inflorescence strongly recurved-spreading; heads tiny; phyllaries linear, obtusish.
8a. S. canadensis gilvocanescens.
Involucre 3 to 3.5 mm. high; leaves subentire or toothed chiefly above the middle. Phyllaries linear-lanceolate, acute or obtusish——**9. S. altissima.**
Leaves (at least the lower) obovate or oval.
Phyllaries lanceolate, acute or acuminate. Lower leaves oblanceolate to obovate, the middle and upper lanceolate to elliptic.
7. S. trinervata.
Phyllaries oblong or oval, obtuse to acutish.
Stem leaves oval, subsessile. Basal leaves obovate, with short petioles; phyllaries oblong, acutish——**4. S. mollis.**
Stem leaves lanceolate to elliptic or obovate.
Inflorescence thyrsoid, the branches erect. Basal leaves with petioles as long as the blades; lower leaves obovate, subentire or crenate-serrate; stem leaves obovate or oblanceolate, narrowed into petiolar bases——**3. S. nana.**
Branches of inflorescence recurved-spreading, the heads secund. Phyllaries oblong, obtuse; lower leaves oblanceolate or spatulate, the upper lanceolate——**6. S. sparsiflora.**

1. Solidago ciliosa Greene, Pittonia **3**: 22. 1896.

Solidago virga-aurea multiradiata Torr. & Gray, in part; D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 154. 1871.

Solidago scopulorum A. Nels. Bot. Gaz. **37**: 264. 1904.

Mountain parks and open slopes of the spruce and subalpine belts. Alberta and British Columbia, southward to Colorado, Utah, and Arizona.

2. Solidago decumbens Greene, Pittonia **3**: 161. 1897.

Open slopes and summits of the spruce and subalpine belts. Wyoming to New Mexico, westward to Nevada.

3. Solidago nana Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 328. 1840.

Solidago nemoralis (form) D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 155. 1871.

Solidago diffusa A. Nels. Bull. Torrey Club **25**: 378, 549. 1898.

Solidago pulcherrima A. Nels. Bull. Torrey Club **25**: 549. 1898.

Solidago radulina Rydb. Bull. Torrey Club **31**: 650. 1905.

Open ridges and plateaus of the yellow pine, aspen, and spruce belts. Alberta, southward to Nebraska, Arizona, and Nevada.

4. Solidago mollis Bartling, Ind. Sem. Goett. **1836**: 5. 1836.

Hillsides of the artemisia and pinyon belts. Dakotas to Texas and westward to Nevada.

5. Solidago bigelovii A. Gray, Proc. Amer. Acad. **16**: 80. 1880.

Foothills and dry slopes of the artemisia, pinyon, and yellow pine belts; southern Nevada. Western Texas to southern Nevada and southward.

6. Solidago sparsiflora A. Gray, Proc. Amer. Acad. **12**: 58. 1877.

Plains and dry hillsides of the artemisia, pinyon, and yellow pine belts. Southern Utah and Arizona.

7. Solidago trinervata Greene, Pittonia **3**: 100. 1896.

Solidago garrettii Rydb. Bull. Torrey Club **37**: 134. 1910.

Dry slopes of the aspen and spruce belts. South Dakota to New Mexico, Utah, and Wyoming.

8. Solidago canadensis L. Sp. Pl. 878. 1753.

Solidago gigantea D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 156. 1871. Not *S. gigantea* Ait. 1789.

Plains and dry hillsides of the artemisia, pinyon, and yellow pine belts. Labrador to British Columbia, southward to West Virginia, Colorado, and Nevada.

8a. Solidago canadensis gilvocanescens Rydb. Contr. U. S. Nat. Herb. **3**: 162. 1895.

Solidago gilvocanescens Smyth, Trans. Kans. Acad. **16**: 161. 1899.

Moist ground and along creeks of the plains. Minnesota to Kansas, westward to Montana and Nevada.

9. Solidago altissima L. Sp. Pl. 878. 1753.

Solidago polyphylla Rydb. Bull. Torrey Club **31**: 651. 1905.

Plains, canyons, and dry hillsides, upward to 1,800 meters. Wyoming to Utah and eastward.

10. Solidago elongata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 327. 1840.

Plains, hillsides, and canyons, upward to 3,000 meters. Montana to British Columbia, southward to Utah, Nevada, and California.

11. Solidago missouriensis Nutt. Journ. Acad. Phila. **7**: 32. 1834.

Solidago stricta D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 154. 1871. Not *S. stricta* Ait. 1789.

Hillsides and canyons, upward to 2,600 meters. Alberta to British Columbia, southward to South Dakota, Colorado, and Nevada.

12. Solidago spectabilis (D. C. Eaton) A. Gray, Proc. Amer. Acad. **17**: 193. 1882.

Solidago guiradonis spectabilis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 154. 1871.

Plains, hillsides, and canyons of the artemisia, pinyon, and yellow pine belts. Utah to southern California.

13. Solidago occidentalis (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 226. 1842.

Euthamia occidentalis Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 326. 1840.

Artemisia belt. Alberta to New Mexico, California, and British Columbia.

14. Solidago petradoria Blake, nom. nov.

Chrysoma pumila Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 325. 1840.

Solidago pumila Torr. & Gray, Fl. N. Amer. **2**: 210. 1842. Not *S. pumila* Crantz. 1766.

Petradoria pumila Greene, Erythea **3**: 13. 1895.

Artemisia, pinyon, and yellow pine belts. Wyoming to Texas, Arizona, and Nevada.

15. Solidago parryi (A. Gray) Greene, Erythea **2**: 57. 1894.

Aplopappus parryi A. Gray, Amer. Journ. Sci. II. **33**: 239. 1862.

Oreochrysum parryi Rydb. Bull. Torrey Club **33**: 153. 1906.

Yellow pine, aspen, spruce, and subalpine belts. Wyoming to New Mexico.

11. APLOPAPPUS Cass.

Stems strictly herbaceous, the caudices sometimes woody.
Leaves toothed to bipinnatifid, the teeth with white spinose tips; phyllaries spinulose-tipped.
Heads discoid——1. A. nuttallii.
Heads radiate.
Plant annual. Involucre hispid-pilose——2. A. gracilis.
Plant perennial.
Leaves denticulate or once pinnatifid; stem hispidulous-puberulous, usually 30 to 60 cm. high, rather sparsely leafy.
3. A. spinulosus gooddingii.
Leaves, at least the lower, bipinnatifid; stems subtomentose-pilose and somewhat stipitate-glandular, usually 30 cm. high or less, densely leafy——3a. A. spinulosus turbinellus.
Leaves entire or toothed, the teeth, when present, stiff but not tipped with white spines (except in *A. carthamoides cusickii*); phyllaries not spinose-tipped.
Plants with woody branched caudices; leaves triplinerved and veiny.
Plant densely hispidulous throughout——16. A. acaulis.
Plant essentially glabrous except for the hispidulous margins and sometimes the under surface of the leaves.
Phyllaries very obtuse——17. A. armerioides.
Phyllaries short-pointed.
Leaves spatulate-obovate or spatulate-oblanceolate, 2 to 3 cm. long, merely acute——18. A. nelsonii.
Leaves spatulate-lanceolate to spatulate-linear, 3 to 7 cm. long, usually acuminate——19. A. falcatus.
Plants with a taproot or short caudex; leaves not triplinerved or strongly veiny.
Plants dwarf, 6 cm. high or less, from a taproot bearing short caudices; pappus white——15. A. pygmaeus.
Plants with a taproot, usually much more than 10 cm. tall; pappus brownish or dirty white.
Heads discoid or apparently so.
Heads small, about 6 mm. high; rays none——31. A. heterophyllus.
Heads large, about 15 mm. high; rays very short, concealed by the pappus——5. A. carthamoides cusickii
Heads distinctly radiate.
Heads large, the disk 2 cm. wide or more; rays over 1 cm. long.
Stem leaves ovate to ovate-oblong; phyllaries oblong or oval-oblong, obtuse, 3 to 6 mm. wide——6. A. croceus
Stem leaves lance-linear to lanceolate; phyllaries acutish to acuminate, 2.5 mm. wide or less.
Phyllaries glabrous except for the ciliate margin, often acuminate, strongly indurate at base; leaves entire or the upper serrate——7. A. integrifolius.
Phyllaries usually pubescent dorsally, merely short-pointed, herbaceous essentially throughout; leaves dentate.
8. A. clementis.
Heads small or medium-sized, the disk usually less than 2 cm. in diameter; rays less than 1 cm. long.

Plant glandular, especially above_____9. A. subviscosus.
Plant not glandular.
Heads several, subsessile or pedicellate, in a narrow spike or virgate panicle. Plants essentially glabrous, 30 to 60 cm. high or more.
Stem without tufts of wool at base_____10. A. paniculatus.
Stem with tufts of wool at base_____11. A. eriopodus.
Heads not subsessile, solitary or panicled, not in a narrow spike or virgate panicle.
Achenes glabrous. Stems low, sometimes nearly leafless; leaves lanceolate or oblong-lanceolate, toothed or pinnatifid; involucre graduated_____12. A. apargioides.
Achenes pubescent.
Phyllaries distinctly graduate, in 2 or 3 series.
13. A. lanceolatus.
Phyllaries subequal_____14. A. uniflorus.
Stems shrubby.
Leaves conspicuously dotted with impressed glands.
Involucre 7 to 8 mm. high, slightly graduated. Pappus bright white; leaves linear-spatulate, 2 cm. long or less_20. A. linearifolius interior.
Involucre much smaller, or else pappus brownish.
Leaves obovate or cuneate, 4 to 12 mm. wide_____25. A. cuneatus.
Leaves linear to narrowly spatulate.
Outer phyllaries without attentuate herbaceous tips, the phyllaries few, oblong-lanceolate, obtuse or merely acute____28. A. monactis.
Outer phyllaries with attenuate herbaceous tips; leaves very narrowly linear, 2.5 cm. long or less_____29. A. pinifolius.
Leaves obscurely if at all dotted with impressed glands, sometimes glandular-pubescent.
Heads discoid.
Branches densely white-tomentose. Leaves obovate, densely glandular; heads about 14 mm. high_____21. A. macronema.
Branches not white-tomentose.
Leaves oval or oval-ovate, sharply spinous-toothed, strongly reticulate_____4 A. brickellioides.
Leaves linear or narrowly oblanceolate to narrowly obovate, not spinous-toothed or reticulate.
Heads solitary; disk 1 cm. thick or more; outer phyllaries with foliaceous tips_____22. A. suffruticosus.
Heads several to many, corymbose; disk less than 1 cm. thick; outer phyllaries without foliaceous tips.
Leaves 1-nerved.
Phyllaries with thickened apex bearing a large gland.
30. A. acradenius.
Phyllaries scarcely thickened at apex, not bearing a gland.
31. A. heterophyllus.
Leaves 3-nerved_____32. A. scopulorum.
Heads radiate.
Outer phyllaries with conspicuous loose herbaceous tips; heads 12 to 15 mm. high, usually solitary_____22. A. suffruticosus.
Outer phyllaries obscurely if at all herbaceous-tipped; heads 6 to 10 mm. high, clustered.

Plant densely stipitate-glandular.
  Leaves spatulate or oblanceolate, 2 to 3 mm. wide__23. A. watsoni.
  Leaves broadly obovate, 7 to 10 mm. wide_____24. A. rydbergii.
Plant obscurely it at all stipitate-glandular.
  Leaves oblong-oblanceolate_____26. A. cervinus.
  Leaves linear-spatulate_____27. A. nanus.

1. **Aplopappus nuttallii** Torr. & Gray, Fl. N. Amer. **2**: 242. 1842.
Eriocarpum grindelioides Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 321 1840.
Not *Aplopappus grindelioides* DC. 1836.
Sideranthus grindelioides Britton, Bull. Torrey Club **27**: 620. 1900.
Artemisia, pinyon, and yellow pine belts. Nebraska to Alberta, New Mexico, and Arizona.

2. **Aplopappus gracilis** (Nutt.) A. Gray, Mem. Amer. Acad. n. ser. **4**: 76. 1849.
Dieteria gracilis Nutt. Journ. Acad. Phila. n. ser. **1**: 177. 1847.
Sideranthus gracilis A. Nels. Bot. Gaz. **37**: 266. 1904.
Covillea, artemisia, and pinyon belts. Colorado to Mexico.

3. **Aplopappus spinulosus gooddingii** (A. Nels.) Blake.
Sideranthus gooddingii A. Nels. Bot. Gaz. **37**: 266. 1904.
Covillea belt. Nevada.

3a. **Aplopappus spinulosus turbinellus** (Rydb.) Blake, Contr. Gray Herb. n. ser. **52**: 23. 1917.
Eriocarpum australe Greene, Erythea **2**: 108. 1894. Not. *Aplopappus australis* Phil. 1894.
Sideranthus australis Rydb. Bull. Torrey Club **27**: 621. 1900.
Sideranthus puberulus Rydb. Bull. Torrey Club **27**: 622. 1900.
Sideranthus turbinellus Rydb. Bull. Torrey Club **27**: 622. 1900.
Artemisia belt, upward to the spruce belt. Idaho to Mexico.

4. **Aplopappus brickellioides** Blake, Proc. Biol. Soc. Washington **35**: 173. 1922.
Covillea belt; Ash Meadows, Nevada.

5. **Aplopappus carthamoides cusickii** A. Gray, Syn. Fl. 1^2: 126. 1884.
Pyrrocoma cusickii Greene, Erythea **2**: 59. 1894.
Artemisia belt. Oregon and Nevada.

6. **Aplopappus croceus** A. Gray, Proc. Acad. Phila. **1863**: 65. 1864.
Pyrrocoma crocea Greene, Erythea **2**: 69. 1894.
Yellow pine belt. Wyoming to New Mexico and Utah.

7. **Aplopappus integrifolius** Porter; A. Gray, Proc. Amer. Acad. **16**: 79. 1880.
Pyrrocoma integrifolia Greene, Erythea **2**: 69. 1894.
Pyrrocoma lapathifolia Greene, Leaflets **2**: 13. 1909.
Artemisia, pinyon, and yellow pine belts. Saskatchewan to Utah.

8. **Aplopappus clementis** (Rydb.) Blake.
Pyrrocoma clementis Rydb. Bull. Torrey Club **27**: 625. 1900.
Pyrrocoma calendulacea Greene, Leaflets **2**: 9. 1909.
Pyrrocoma subcaesia Greene, Leaflets **2**: 12. 1909.
Pyrrocoma cheiranthifolia Greene, Leaflets **2**: 47. 1910.
Yellow pine belt, upward to the subalpine belt. Wyoming and Utah.

9. **Aplopappus subviscosus** (Greene) Blake.
Pyrrocoma subviscosa Greene, Proc. Acad. Phila. **1895**: 549. 1896.
Artemisia belt. Nevada.

10. Aplopappus paniculatus (Nutt.) A. Gray, Proc. Amer. Acad. **7**: 354. 1868.
Homopappus paniculatus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 331. 1840.
Homopappus glomeratus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 331. 1840.
Homopappus argutus Nutt. Trans. Amer. Phil. Soc. n. ser **7**: 331. 1840.
Homopappus racemosus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 332. 1840.
Pyrrocoma racemosa Torr. & Gray, Fl. N. Amer. **2**: 244. 1842.
Aplopappus racemosus Torr. in Sitgreaves, Rep. Zuñi & Colo. 162. 1854.
Aplopappus racemosus glomerellus A. Gray, Syn. Fl. **1**^{2}: 127. 1884.
Pyrrocoma microdonta Greene, Leaflets **2**: 11. 1909.
Pyrrocoma sessiliflora Greene, Leaflets **2**: 11. 1909.
Pyrrocoma prionophylla Greene, Leaflets **2**: 12. 1909.
Artemisia belt. Oregon to California and Nevada.

11. Aplopappus eriopodus (Greene) Blake.
Pyrrocoma eriopoda Greene, Proc. Acad. Phila. **1895**: 549. 1896.
Artemisia belt. Nevada.

12. Aplopappus apargioides A. Gray, Proc. Amer. Acad. **7**: 354. 1868.
Pyrrocoma apargioides Greene, Erythea **2**: 70. 1894.
Artemisia, pinyon, yellow pine, and aspen belts. California and Nevada.

13. Aplopappus lanceolatus (Hook.) Torr. & Gray, Fl. N. Amer. **2**: 241. 1842.
Donia lanceolata Hook. Fl. Bor. Amer. **2**: 25. 1834.
Aplopappus lanceolatus vaseyi Parry; D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 160. 1871.
Aplopappus tenuicaulis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 160. 1871.
Aplopappus lanceolatus tenuicaulis A. Gray, Syn. Fl. **1**^{2}: 129. 1884.
Pyrrocoma tenuicaulis Greene, Erythea **2**: 69. 1894.
Pyrrocoma lanceolata Greene, Erythea **2**: 69. 1894.
Pyrrocoma solidaginea Greene, Proc. Acad. Phila. **1895**: 549. 1896.
Pyrrocoma vaseyi Rydb. Bull. Torrey Club **27**: 626. 1900.
Pyrrocoma kennedyi A. Nels. Bot. Gaz. **37**: 265. 1904.
Artemisia belt, upward to the spruce belt. Saskatchewan to British Columbia, southward to Nevada.

14. Aplopappus uniflorus (Hook.) Torr. & Gray, Fl. N. Amer. **2**: 241. 1842.
Donia uniflora Hook. Fl. Bor. Amer. **2**: 25. *pl. 124*. 1834.
Homopappus inuloides Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 333. 1840.
Aplopappus inuloides Torr. & Gray, Fl. N. Amer. **2**: 241. 1842.
Pyrrocoma inuloides Greene, Erythea **2**: 60. 1894.
Pyrrocoma uniflora Greene, Erythea **2**: 60. 1894.
Artemisia belt, upward to the spruce belt. Saskatchewan to Utah.

15. Aplopappus pygmaeus (Torr. & Gray) A. Gray, Amer. Journ. Sci. II. **33**: 239. 1862.
Stenotus pygmaeus Torr. & Gray, Fl. N. Amer. **2**: 237. 1842.
Tonestus pygmaeus A. Nels. Bot. Gaz. **37**: 262. 1904.
Alpine belts. Wyoming to New Mexico.

16. Aplopappus acaulis (Nutt.) A. Gray, Proc. Amer. Acad. **7**: 353. 1868.
Chrysopsis acaulis Nutt. Journ. Acad. Phila. **7**: 33. *pl. 3*. 1834.
Stenotus acaulis Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 334. 1840.
Artemisia, pinyon, and yellow pine belts. Saskatchewan to Nevada.

17. Aplopappus armerioides (Nutt.) A. Gray, Syn. Fl. **1**^{2}: 132. 1884.
Stenotus armerioides Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 334. 1840.
Artemisia, pinyon, and yellow pine belts. Nebraska to Manitoba, southward to New Mexico.

18. Aplopappus nelsonii Blake, nom. nov.
Stenotus latifolius A. Nels. Bot. Gaz. **37**: 266. 1904. Not *Aplopappus latifolius* Reiche, 1901.
Yellow pine belt. Utah.

19. Aplopappus falcatus (Rydb.) Blake.
Chrysopsis caespitosa Nutt. Journ. Acad. Phila. **7**: 33. 1834. Not *Aplopappus caespitosus* Nutt. 1840.
Stenotus caespitosus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 334. 1840.
Aplopappus acaulis glabratus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 161. 1871.
Stenotus falcatus Rydb. Bull. Torrey Club **27**: 616. 1900.
Artemisia, pinyon, and yellow pine belts. Saskatchewan to Nevada.

20. Aplopappus linearifolius interior (Coville) Jones, Proc. Calif. Acad. II. **5**: 697. 1895.
Aplopappus interior Coville, Proc. Biol. Soc. Washington **7**: 65. 1892.
Stenotopsis interior Rydb. Bull. Torrey Club **27**: 617. 1900.
Artemisia belt. Southern Utah to Arizona and California.

21. Aplopappus macronema A. Gray, Proc. Amer. Acad. **6**: 542. 1865.
Macronema discoideum Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 322. 1840. Not *Aplopappus discoideus* DC. 1836.
Yellow pine belt, upward to the subalpine belt. Oregon to Colorado, and California.

22. Aplopappus suffruticosus (Nutt.) A. Gray, Proc. Amer. Acad. **6**: 542. 1865.
Macronema suffruticosa Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 322. 1840.
Yellow pine, aspen, and spruce belts. Montana to Arizona and California.

23. Aplopappus watsoni A. Gray, Proc. Amer. Acad. **16**: 79. 1880.
Macronema watsoni Greene, Erythea **2**: 74. 1894.
Yellow pine belt. Utah, Arizona, and Nevada.

24. Aplopappus rydbergii Blake, nom. nov.
Macronema obovatum Rydb. Bull. Torrey Club **27**: 618. 1900. Not *Aplopappus obovatus* Reiche. 1894.
Yellow pine belt. Utah.

25. Aplopappus cuneatus A. Gray, Proc. Amer. Acad. **8**: 635. 1873.
Ericameria cuneata McClatchie, Erythea **2**: 124. 1894.
Artemisia and pinyon belts. California, Nevada, and Arizona.

26. Aplopappus cervinus S. Wats. Amer. Nat. **7**: 301. 1873.
Ericameria cervina Rydb. Fl. Rocky Mount. 853. 1917.
Artemisia and pinyon belts. Utah.

27. Aplopappus nanus (Nutt.) D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 150. 1871.
Ericameria nana Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 318. 1840.
Yellow pine belt. Washington to Utah and Nevada.

28. Aplopappus monactis A. Gray, Proc. Amer. Acad. **19**: 1. 1883.
Ericameria monactis McClatchie, Erythea **2**: 124. 1894.
Tumionella monactis Greene, Leaflets **1**: 173. 1906.
Covillea and artemisia belts. California and Nevada.

29. Aplopappus pinifolius A. Gray, Proc. Amer. Acad. **8**: 636. 1873.
Ericameria pinifolia H. M. Hall, Univ. Calif. Publ. Bot. **3**: 54. 1907.
Covillea belt. Southern California and Nevada.

30. Aplopappus acradenius (Greene) Blake.
Bigelovia acradenia Greene, Bull. Torrey Club **10**: 126. 1883.
Isocoma acradenia Greene, Erythea **2**: 111. 1894.
Covillea belt. Southern California and Utah to Arizona.

31. Aplopappus heterophyllus (A. Gray) Blake.
Linosyris heterophyllus A. Gray, Pl. Wright. **1**: 95. 1852.
Linosyris wrightii A. Gray, Pl. Wright. **1**: 95. 1852.
Bigelovia wrightii A. Gray, Proc. Amer. Acad. **8**: 639. 1873.
Isocoma wrightii Rydb. Bull. Torrey Club **33**: 152. 1906.
Covillea and artemisia belts. Colorado to Mexico.

32. Aplopappus scopulorum (Jones) Blake.
Bigelovia menziesii scopulorum Jones, Proc. Calif. Acad. II. **5**: 692. 1895.
Isocoma scopulorum Rydb. Fl. Rocky Mount. 859. 1917.
Artemisia, pinyon, and yellow pine belts. Southern Utah.

12. CHRYSOTHAMNUS Nutt. RABBITBRUSH

Leaves dotted with impressed glands.
Flowers whitish----24. C. albidus.
Flowers yellow.
Phyllaries with a prominent gland at apex----1. C. teretifolius.
Phyllaries without an apical gland----2. C. paniculatus.
Leaves not dotted with impressed glands.
Branches and often leaves tomentose, at least when young, sometimes glabrate in age but then yellowish green.
Phyllaries, at least the outer, strongly acuminate.
Achenes pubescent.
Leaves more or less distinctly 3-nerved, green, linear, comparatively long----3. C. parryi.
Leaves 1-nerved, or, if rarely 3-nerved, short and usually tomentose.
Involucre not tomentose or arachnoid, the phyllaries either slightly ciliate or glandular-puberulous----4. C. asper.
Involucre more or less densely tomentose or arachnoid.
Phyllaries arachnoid-ciliate on margin, essentially glabrous on back; upper leaves usually equaling or exceeding the subtended heads; leaves green; rays present--5. C. bloomeri.
Phyllaries more or less tomentose or arachnoid on back as well as on margin; leaves usually persistently tomentose; rays wanting.
Leaves narrowly linear or linear-filiform.
Upper leaves conspicuously exceeding the subtended heads, linear-filiform----6. C. howardi.
Upper leaves not exceeding the heads----7. C. newberryi.
Leaves linear-oblanceolate or spatulate-linear.
Heads several at tips of branches, not exceeded by the leaves----8. C. nevadensis.
Heads usually solitary at tips of branches, exceeded by the leaves----8a. C. nevadensis monocephalus.
Achenes glabrous----9. C. bigelovii.
Phyllaries obtuse or merely acute.
Achenes glabrous.

Leaves linear-filiform or linear, involute.
Involucre arachnoid or tomentose——9. C. bigelovii.
Involucre essentially glabrous——10. C. leiospermus.
Leaves linear-oblanceolate, not involute. Involucre tomentulose.
11. C. glareosus.
Achenes pubescent.
Involucre tomentulose or tomentose, at least on the outer phyllaries; leaves usually gray or white-tomentose.
Tomentum loose, copious, nearly pure white; corolla tube arachnoid-pubescent.
Corolla lobes lanceolate, 1 to 2 mm. long; some of the phyllaries acute——12. C. nauseosus.
Corolla lobes short-ovate, less than 1 mm. long; phyllaries all obtuse——12a. C. nauseosus hololeucus.
Tomentum compact, usually grayish; corolla tube glabrous or puberulent.
Leaves 3 to 6 mm. wide, 3-nerved. Phyllaries very obtuse.
13. C. salicifolius.
Leaves 2 mm. wide or less, 1-nerved.
Shrubs 0.5 to 2 meters high; corolla 8 to 10 mm. long.
Leaves of flowering branchlets often crowded, mostly 3 to 6 cm. long; herbage not fragrant——14. C. speciosus.
Leaves of flowering branchlets few, 1 to 3 cm. long; herbage usually fragrant——14a. C. speciosus gnaphalodes.
Shrub 20 to 60 cm. high; corolla 6 to 8 mm. long.
14b. C. speciosus frigidus.
Involucre glabrous, except for the sometimes ciliate margin of the phyllaries; leaves usually green.
Shrub rushlike, nearly or quite leafless at flowering time; phyllaries strongly keeled, in very distinct rows, the involucre sharply angled——17. C. mohavensis.
Shrubs not rushlike, leafy; involucre not sharply angled.
Leaves linear or linear-oblanceolate, more than 1 mm. wide, usually 3 or 5-nerved.
Leaves green, linear, usually 1 to 2 mm. wide; involucre 6 to 8 mm. high——15. C. graveolens.
Leaves tomentose, narrowly linear-oblanceolate, usually 2 to 4 mm. wide; involucre 9 to 11 mm. high.
16. C. californicus.
Leaves linear-filiform or very narrowly linear, 1 mm. wide or less, 1-nerved.
Phyllaries ciliate, flat, not carinate——18. C. oreophilus.
Phyllaries not ciliate, somewhat carinate——19. C. pinifolius.
Branches glabrous or puberulous, never tomentose, the bark usually white and shining. Leaves never tomentose.
Heads with 1 to 4 rays——5. C. bloomeri.
Heads discoid.
Involucre 8 to 15 mm. high; phyllaries acuminate, strongly carinate.
Plant 20 cm. high or less, minutely and densely hirtellous.
20. C. depressus.
Plant 0.6 to 1 meter high, glabrous, or the leaves ciliate.
21. C. pulchellus.

Involucre 8 mm. high or usually much less; phyllaries usually obtuse, scarcely or not carinate.
Achenes glabrous.
Leaves lanceolate, acuminate, 3 or 5-nerved____**22. C. gramineus.**
Leaves linear or spatulate-linear, acute or obtuse, 1-nerved.
23. C. vaseyi.
Achenes pubescent.
Phyllaries, at least the outer, with conspicuous, abruptly narrowed, acuminate, herbaceous tips.
Flowers whitish; involucre 7 to 8 mm. high____**24. C. albidus.**
Flowers yellow; involucre 5 to 7 mm. high__**25. C. laricinus.**
Phyllaries without conspicuous, abruptly narrowed, acuminate, herbaceous tips.
Stem and leaves densely puberulous or hirtellous.
Leaves 3 to 6 mm. wide, usually flat____**26. C. lanceolatus.**
Leaves 1 to 2.5 mm. wide, usually twisted__**27. C. puberulus.**
Stem and leaves glabrous, or the latter sometimes hispidulous-ciliolate, the stem sometimes sparsely puberulous.
Leaves linear-filiform or very narrowly linear, 1 mm. wide or less_____**28. C. stenophyllus.**
Leaves linear to lanceolate, 1 to 9 mm. wide.
Phyllaries acute to acuminate. Leaves very narrowly linear, about 1.5 mm. wide_____**29. C. greenei.**
Phyllaries obtuse or, if rarely acute, the leaves much broader.
Leaves lanceolate or lance-elliptic, flat, 3 to 9 mm. wide.
30. C. linifolius.
Leaves less than 3 mm. wide or, if broader, more or less twisted.
Phyllaries acuminate or very acute.
31d. C. viscidiflorus stenolepis.
Phyllaries obtuse or merely acutish.
Leaves 2 mm. wide or more.
Involucre viscid; leaves scarcely spinulose-ciliolate.
31. C. viscidiflorus.
Involucre not viscid; leaves conspicuously spinulose-ciliolate.
Leaves usually less than 3 mm. wide, strongly twisted_____**31a. C. viscidiflorus tortifolius.**
Leaves usually 3 mm. wide or more, comparatively little twisted_**31b. C. viscidiflorus serrulatus.**
Leaves less than 2 mm. wide.
31c. C. viscidiflorus pumilus.

1. Chrysothamnus teretifolius (Dur. & Hilgard) H. M. Hall, Univ. Calif. Publ. Bot. **3**: 57. 1907.

Linosyris teretifolia Dur. & Hilgard, U. S. Rep. Expl. Miss. Pacif. **5**: 9. *pl.* **7.** 1855.

Bigelovia teretifolia A. Gray, Proc. Amer. Acad. **8**: 644. 1873.

Chrysoma teretifolia Greene, Erythea **3**: 12. 1895.

Covillea and artemisia belts. Nevada, southeastern California, and Arizona.

2. Chrysothamnus paniculatus (A. Gray) H. M. Hall, Univ. Calif. Publ. Bot. **3**: 58. 1907.

Linosyris viscidiflora paniculata **A. Gray in Torr. U. S. & Mex. Bound.** Bot. 80. 1859, nomen nudum.

Bigelovia paniculata A. Gray, Proc. Amer. Acad. **8**: 644. 1873.
Ericameria paniculata Rydb. Fl. Rocky Mount. 853. 1917.
Covillea and artemisia belts. Southern Utah, Arizona, and California.

3. **Chrysothamnus parryi** (A. Gray) Greene, Erythea **3**: 113. 1895.
Linosyris parryi A. Gray, Proc. Acad. Phila. **1863**: 66. 1863.
Bigelovia parryi A. Gray, Proc. Amer. Acad. **8**: 642. 1873.
Yellow pine, aspen, and spruce belts. Wyoming, Colorado, and Utah.

4. **Chrysothamnus asper** Greene, Leaflets **1**: 80. 1904.
Chrysothamnus parryi asper Hall & Clements, Phylog. Meth. Taxon. 200. 1923.
Yellow pine and aspen belts. California and Nevada.

5. **Chrysothamnus bloomeri** (A. Gray) Greene, Erythea **3**: 115. 1895.
Aplopappus bloomeri A. Gray, Proc. Amer. Acad. **6**: 541. 1865.
Yellow pine, aspen, and spruce belts. Washington to California and Nevada.

6. **Chrysothamnus howardi** (Parry) Greene, Erythea **3**: 113. 1895.
Linosyris howardi Parry; A. Gray, Proc. Amer. Acad. **6**: 541. 1865.
Bigelovia howardii A. Gray, Proc. Amer. Acad. **8**: 641. 1873.
Chrysothamnus parryi howardi Hall & Clements, Phylog. Meth. Taxon. 201. 1923.
Artemisia, pinyon, and yellow pine belts. Colorado, Utah, and New Mexico.

7. **Chrysothamnus newberryi** Rydb. Bull. Torrey Club **31**: 652. 1905.
Bigelovia howardii attenuata Jones, Proc. Calif. Acad. II. **5**: 691. 1895.
Chrysothamnus attenuatus Rydb. Bull. Torrey Club **37**: 130. 1910.
Chrysothamnus parryi attenuatus Hall & Clements, Phylog. Meth. Taxon. 201. 1923.
Artemisia, pinyon, and yellow pine belts. Wyoming to New Mexico, Utah, and Nevada.

8. **Chrysothamnus nevadensis** (A. Gray) Greene, Erythea **3**: 114. 1895.
Linosyris howardii nevadensis A. Gray, Proc. Amer. Acad. **6**: 541. 1865.
Bigelovia howardii nevadensis A. Gray, Proc. Amer. Acad. **8**: 641. 1873.
Bigelovia nevadensis A. Gray, Syn. Fl. 1^2: 136. 1884.
Chrysothamnus parryi nevadensis Hall & Clements, Phylog. Meth. Taxon. 201. 1923.
Plains, canyons, and mountain sides, upward to 2,700 meters. Nevada and adjacent California.

8a. **Chrysothamnus nevadensis monocephalus** (Nels. & Kennedy) Smiley, Univ. Calif. Publ. Bot. **9**: 357. 1921.
Chrysothamnus monocephalus Nels. & Kennedy, Proc. Biol. Soc. Washington **19**: 39. 1906.
Chrysothamnus parryi monocephalus Hall & Clements, Phylog. Meth. Taxon. 200. 1923.
Spruce and subalpine belts. Mount Rose, Nevada.

9. **Chrysothamnus bigelovii** (A. Gray) Greene, Erythea **3**: 112. 1895.
Linosyris bigelovii A. Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 98. 1857.
Bigelovia bigelovii A. Gray, Proc. Amer. Acad. **8**: 642. 1873.
Chrysothamnus nauseosus bigelovii Hall & Clements, Phylog. Meth. Taxon. 217. 1923.
Plains, dry hillsides, and canyons of the artemisia, pinyon, and yellow pine belts. Colorado to Texas, Utah, and eastern Arizona.

10. **Chrysothamnus leiospermus** (A. Gray) Greene, Erythea **3**: 113. 1895.
Bigelovia leiosperma A. Gray, Syn. Fl. 1^2: 139. 1884.
Bigelovia leiosperma abbreviata Jones, Proc. Calif. Acad. II. **5**: 693. 1895.

Chrysothamnus nauseosus leiospermus Hall & Clements, Phylog. Meth. Taxon. 217. 1923.

Desert areas of the artemisia belt. Utah and Nevada.

11. Chrysothamnus glareosus (Jones) Rydb. Fl. Rocky Mount. 858. 1917.

Bigelovia glareosa Jones, Zoe **2**: 247. 1891.

Chrysothamnus nauseosus glareosus Hall & Clements, Phylog. Meth. Taxon. 217. 1923.

Plains and mountain sides, upward to 2,400 meters. Utah.

12. Chrysothamnus nauseosus (Pall.) Britton in Britt. & Brown, Illustr. Fl. **3**: 326. 1898.

Chrysoma nauseosa Pall.; Pursh, Fl. Amer. Sept. 517. 1814.

Bigelovia graveolens albicaulis A. Gray, Proc. Amer. Acad. **8**: 645. 1873.

Plains and foothills, upward to 2,100 meters. British Columbia to Wyoming and Utah.

12a. Chrysothamnus nauseosus hololeucus (A. Gray) H. M. Hall, Univ. Calif. Publ. Bot. **7**: 166. 1919.

Bigelovia graveolens hololeuca A. Gray, Proc. Amer. Acad. **8**: 645. 1873.

Artemisia belt. Nevada and California.

13. Chrysothamnus salicifolius Rydb. Bull. Torrey Club **37**: 130. 1910.

Chrysothamnus nauseosus salicifolius Hall & Clements, Phylog. Meth. Taxon. 213. 1923.

Plains and foothills, upward to the yellow pine belt. Utah.

14. Chrysothamnus speciosus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 323. 1840.

Chrysothamnus pulcherrimus A. Nels. Bot. Gaz. **28**: 370. 1899.

Chrysothamnus nauseosus speciosus Hall & Clements, Phylog. Meth. Taxon. 211. 1923.

Plains of the artemisia belt. Montana and Idaho to Colorado and Arizona.

14a. Chrysothamnus speciosus gnaphalodes Greene, Erythea **3**: 110. 1895.

Chrysothamnus nauseosus gnaphalodes Hall & Clements, Phylog. Meth. Taxon. 211. 1923.

Desert areas of the Covillea and artemisia belts. Nevada, California, and Arizona.

14b. Chrysothamnus speciosus frigidus (Greene) Blake.

Chrysothamnus frigidus Greene, Erythea **3**: 112. 1895.

Bigelovia turbinata Jones, Proc. Calif. Acad. II. **5**: 691. 1895.

Chrysothamnus pallidus A. Nels. Bot. Gaz. **28**: 372. 1899.

Chrysothamnus turbinatus Rydb. Fl. Rocky Mount. 859. 1917.

Chrysothamnus nauseosus frigidus H. M. Hall, Univ. Calif. Publ. Bot. **7**: 170. 1919.

Plains and mountain sides, upward to 2,400 meters. Saskatchewan to Alberta, Colorado, and Utah.

15. Chrysothamnus graveolens (Nutt.) Greene, Erythea **3**: 108. 1895.

Chrysocoma graveolens Nutt. Gen. **2**: 136. 1818.

Bigelovia graveolens A. Gray, Proc. Amer. Acad. **8**: 644. 1873.

Chrysothamnus nauseous graveolens Hall & Clements, Phylog. Meth. Taxon. 214. 1923.

Plains and mountain sides, upward to 2,100 meters. Nebraska to Montana, Utah, and New Mexico.

16. Chrysothamnus californicus Greene, Erythea **3**: 111. 1895.

Plains and mountain sides, upward to 2,400 meters. California and Nevada.

17. Chrysothamnus mohavensis Greene, Erythea **3**: 113. 1895.
Bigelovia mohavensis Greene; A. Gray, Syn. Fl. 1²: 138. 1884.
Chrysothamnus nauseosus mohavensis Hall & Clements, Phylog. Meth. Taxon. 216. 1923.
Desert areas and dry hillsides of the Covillea belt. Southern California to southern Utah and Arizona.

18. Chrysothamnus oreophilus A. Nels. Bot. Gaz. **28**: 375. 1899.
Mountain sides and stony ridges of the pinyon, yellow pine, and aspen belts. Wyoming, Colorado, and Utah.

19. Chrysothamnus pinifolius Greene, Pittonia **5**: 60. 1902.
Chrysothamnus consimilis Greene, Pittonia **5**: 60. 1902.
Chrysothamnus nauseosus viridulus H. M. Hall, Univ. Calif. Publ. Bot. **7**: 177. 1919.
Chrysothamnus nauseosus pinifolius Hall & Clements, Phylog. Meth. Taxon. 215. 1923.
Chrysothamnus nauseosus consimilis Hall & Clements, Phylog. Meth. Taxon. 215. 1923.
Valleys, plains, and mountain sides of the artemisia, pinyon, and yellow pine belts. Colorado to Oregon, Nevada, and New Mexico.

20. Chrysothamnus depressus Nutt. Journ. Acad. Phila. II. **1**: 171. 1847.
Bigelovia depressa A. Gray, Proc. Amer. Acad. **8**: 643. 1873.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Colorado, Utah, and New Mexico.

21. Chrysothamnus pulchellus (A. Gray) Greene, Erythea **3**: 107. 1895.
Linosyris pulchella A. Gray, Pl. Wright. **1**: 96. 1852.
Bigelovia pulchella A. Gray, Proc. Amer. Acad. **8**: 643. 1873.
Plains, dry hillsides, and canyons of the Covillea and artemisia belts. Kansas to Utah, Texas, and Mexico.

22. Chrysothamnus gramineus H. M. Hall, Muhlenbergia **2**: 342. 1916.
Yellow pine belt: Charleston Mountains, Nevada.

23. Chrysothamnus vaseyi (A. Gray) Greene, Erythea **3**: 96. 1895.
Bigelovia vaseyi A. Gray, Proc. Amer. Acad. **12**: 58. 1876.
Pinyon, yellow pine, and aspen belts. Wyoming, Colorado, and Utah.

24. Chrysothamnus albidus (Jones) Greene, Erythea **3**: 107. 1895.
Bigelovia albida Jones; A. Gray, Proc. Amer. Acad. **17**: 209. 1882.
Plains and dry foothills of the artemisia belt. California, Nevada, and Utah.

25. Chrysothamnus laricinus Greene, Pittonia **5**: 110. 1903.
Plains and foothills of the artemisia belt. Utah, Nevada, and Arizona.

26. Chrysothamnus lanceolatus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 323. 1840.
Bigelovia lanceolata A. Gray, Proc. Amer. Acad. **8**: 639. 1873.
Chrysothamnus viscidiflorus lanceolatus Hall & Clements, Phylog. Meth. Taxon. 181. 1923.
Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Montana to Washington, Nevada, and Colorado.

27. Chrysothamnus puberulus (D. C. Eaton) Greene, Erythea **3**: 93. 1895.
LITTLE RABBITBRUSH.
Linosyris viscidiflora puberula D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 158. 1871.

Bigelovia douglasii puberula A. Gray, Proc. Amer. Acad. **8**: 646. 1873.
Chrysothamnus marianus Rydb. Bull. Torrey Club **37**: 131. 1910.
Chrysothamnus viscidiflorus puberulus Hall & Clements, Phylog. Meth. Taxon. 182. 1923.

Plains and mountain sides, upward to 3,000 meters. British Columbia to Montana, Nevada, and Colorado.

28. Chrysothamnus stenophyllus (A. Gray) Greene, Erythea **3**: 94. 1895.
Bigelovia douglasii stenophylla A. Gray, Proc. Amer. Acad. **8**: 646. 1873.
Chrysothamnus viscidiflorus stenophyllus Hall & Clements, Phylog. Meth. Taxon. 183. 1923.

Plains and mountain sides, upward to 2,400 meters. Montana to Wyoming, Nevada, and Arizona.

29. Chrysothamnus greenei (A. Gray) Greene, Erythea **3**: 94. 1895.
Bigelovia greenei A. Gray, Proc. Amer. Acad. **11**: 75. 1876.
Chrysothamnus scoparius Rydb. Bull. Torrey Club **28**: 504. 1901.

Plains and mountain sides, upward to 2,400 meters. Colorado, Utah, and New Mexico.

30. Chrysothamnus linifolius Greene, Pittonia **3**: 24. 1896.
Linosyris viscidiflora latifolia D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 157. 1871.
Bigelovia douglasii latifolia A. Gray, Proc. Amer. Acad. **8**: 646. 1873.
Chrysothamnus latifolius Rydb. Bull. Torrey Club **33**: 152. 1906.
Chrysothamnus viscidiflorus latifolius Hall & Clements, Phylog. Meth. Taxon. 184. 1923.
Chrysothamnus viscidiflorus linifolius Hall & Clements, Phylog. Meth. Taxon. 184. 1923.

Plains and mountain sides, upward to 2,400 meters. Idaho to Colorado, Utah, and Nevada.

31. Chrysothamnus viscidiflorus (Hook.) Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 324. 1840.
Crinitaria viscidiflora Hook. Fl. Bor. Amer. **2**: 24. 1834.
Bigelovia douglasii A. Gray, Proc. Amer. Acad. **8**: 645. 1873.

Plains of the artemisia belt. Montana to Wyoming, Washington, and California.

31a. Chrysothamnus viscidiflorus tortifolius (A. Gray) Greene, Erythea **3**: 96. 1895.
Bigelovia douglasii tortifolia A. Gray, Proc. Amer. Acad. **8**: 646. 1873.
Chrysothamnus tortifolius Greene, Fl. Franc. 368. 1897.

Plains, mountain sides, and canyons, upward to 2,700 meters. California and Nevada.

31b. Chrysothamnus viscidiflorus serrulatus (Torr.) Greene, Erythea **3**: 96. 1895.
Linosyris serrulata Torr. in Stansb. Rep. Expl. Great Salt Lake. 389. 1852.
Bigelovia douglasii serrulata A. Gray, Proc. Amer. Acad. **8**: 646. 1873.
Chrysothamnus glaucus A. Nels. Bull. Torrey Club **25**: 377. 1898.
Chrysothamnus serrulatus Rydb. Bull. Torrey Club **33**: 152. 1906.

Plains and mountain sides, upward to 2,700 meters. Wyoming, Utah, and Arizona.

31c. Chrysothamnus viscidiflorus pumilus (Nutt.) Hall & Clements, Phylog. Meth. Taxon. 182. 1923.

Chrysothamnus pumilus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 323. 1840.
Bigelovia douglasii pumila A. Gray, Syn. Fl. **1**²: 140. 1884.
Bigelovia douglasii spathulata Jones, Proc. Calif. Acad. II. **5**: 690. 1895.

Plains and mountain sides of the artemisia, pinyon, and yellow pine belts. Montana to Colorado, Nevada, and Oregon.

31d. Chrysothamnus viscidiflorus stenolepis (Rydb.) Blake.

Chrysothamnus stenolepis Rydb. Bull. Torrey Club **37**: 131. 1910.

Plains and foothills of the artemisia, pinyon, and yellow pine belts. Montana, Idaho, and Utah.

13. MONOPTILON Torr. & Gray

Pappus a scarious cup and a single subplumose bristle; disk corollas pilose below ..... 1. M. bellidiforme.
Pappus of numerous unequal bristles; disk corollas nearly glabrous. ..... 2. M. bellioides.

1. Monoptilon bellidiforme Torr. & Gray; A. Gray, Proc. Bost. Soc. Nat. Hist. 1: 210. 1845.

Covillea belt. Southwestern Utah to California.

2. Monoptilon bellioides (A. Gray) H. M. Hall, Univ. Calif. Publ. Bot. **3**: 75. 1907.

Eremiastrum bellioides A. Gray, Mem. Amer. Acad. II. **5**: 321. 1854.

Covillea belt. Utah, Nevada, Arizona, and California.

14. TOWNSENDIA Hook.

Plants strictly acaulescent, the heads sessile among the tufted basal leaves.
  Achenes nearly or quite glabrous at maturity ..... 3. T. montana.
  Achenes rather densely pubescent.
    Leaves essentially linear; involucre about 1 cm. high ..... 1. T. exscapa.
    Leaves spatulate or oblanceolate; involucre 12 to 15 mm. high. ..... 2. T. intermedia.
Plants caulescent at least at maturity, the stems often short.
  Achenes nearly glabrous at maturity; phyllaries all obtuse or only the inmost acutish ..... 3. T. montana.
  Achenes densely pubescent; phyllaries all acute.
    Hairs of achene obscurely or not at all glochidiate-capitellate.
      Pappus of the ray flowers as long as that of the disk flowers.
        Stems usually 5 cm. high or less; plant perennial ..... 4. T. scapigera.
        Stems 5 to 10 cm. high; plant biennial ..... 5. T. florifer.
      Pappus of the ray flowers much shorter than that of the disk flowers.
        Pappus of the ray flowers about half as long as that of the disk. ..... 6. T. ambigua.
        Pappus of the ray flowers reduced to a crown of very short squamellae. ..... 7. T. watsoni.
    Hairs of achene distinctly glochidiate-capitellate.
      Pappus of the ray flowers as long as that of the disk flowers. Dwarf cinereous-strigose perennial; leaves spatulate ..... 8. T. arizonica.
      Pappus of the ray flowers much shorter than that of the disk flowers.
        Pappus of the ray flowers about half as long as that of the disk flowers ..... 9. T. incana.
        Pappus of the ray flowers reduced to a crown of very small squamellae. ..... 10. T. strigosa.

1. **Townsendia exscapa** (Richards.) Porter, Mem. Torrey Club 5: 321. 1894.
Aster ? exscapus Richards. Bot. App. Frankl. Journ. 32. 1823.
Townsendia sericea Hook. Fl. Bor. Amer. 2: 16. 1834.
Townsendia mensana Jones, Contr. West. Bot. 13: 15. 1910.
Plains and upward to the spruce belt. Saskatchewan to Arizona and Texas.

2. **Townsendia intermedia** Rydb.; Britton, Man. 944. 1901.
Plains. Nebraska to Wyoming, south to Arizona.

3. **Townsendia montana** Jones, Zoe 2: 262. 1893.
Townsendia dejecta A. Nels. Bot. Gaz. 37: 267. 1904.
Spruce and subalpine belts. Utah.

4. **Townsendia scapigera** D. C. Eaton in King, Geol. Expl. 40th Par. 5: 145. *pl. 17.* 1871.
Townsendia scapigera caulescens D. C. Eaton in King, Geol. Expl. 40th Par. 5: 145. 1871.
Yellow pine, aspen, and spruce belts. Montana to Wyoming, westward to California.

5. **Townsendia florifer** (Hook.) A. Gray, Proc. Amer. Acad. 16: 84. 1880.
Erigeron florifer Hook. Fl. Bor. Amer. 2: 20. 1834.
Townsendia florifer communis Jones, Proc. Calif. Acad. II. 5: 697. 1895.
Artemisia belt. Montana to Washington, southward to Utah.

6. **Townsendia ambigua** (A. Gray) Rydb. Fl. Rocky Mount. 874. 1917.
Townsendia scapigera ambigua A. Gray, Proc. Amer. Acad. 16: 84. 1880.
Yellow pine, aspen, and spruce belts. Utah and Idaho.

7. **Townsendia watsoni** A. Gray, Proc. Amer. Acad. 16: 84. 1880.
Artemisia belt. Utah.

8. **Townsendia arizonica** A. Gray, Proc. Amer. Acad. 16: 85. 1880.
Artemisia, pinyon, and yellow pine belts. Utah, Arizona, and New Mexico.

9. **Townsendia incana** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 305. 1840.
Townsendia incana ambigua Jones, Zoe 4: 264. 1893.
Townsendia incana prolixa Jones, Contr. West. Bot. 13: 15. 1910.
Artemisia, pinyon, and yellow pine belts. Wyoming to New Mexico, Arizona, and Utah.

10. **Townsendia strigosa** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 306. 1840.
Artemisia belt. Wyoming to New Mexico and Arizona.

15. ASTER L. Aster

Plants annual or biennial.
Leaves entire; plants annual; rays inconspicuous, not or only slightly exceeding the disk.
Phyllaries linear, acute---------- **45. A. brachyactis.**
Phyllaries linear-oblong, oblong, or spatulate-oblong, obtuse.
46. A. frondosus.
Leaves spinulose-toothed or pinnatifid, rarely entire; plants biennial or annual; rays conspicuous, much exceeding the disk.
Plants annual; leaves pinnatifid.
Heads small, the disk 5 to 7 mm. high; green tips of the phyllaries rhombic or rhombic-lanceolate, shorter than the indurate portion; leaves once pinnatifid---------- **35. A. parvulus.**

Heads larger, the disk 8 to 12 mm. high; green tips of the phyllaries subulate or lance-subulate, usually equaling or exceeding the indurate portion.

Green tips of the phyllaries erect, scarcely narrower than the indurate portion; leaves usually once pinnatifid__**36. A. tagetinus.**

Green tips of the phyllaries spreading, distinctly narrower than the indurate portion; leaves usually twice pinnatifid.

37. A. tanacetifolius.

Plants biennial; leaves merely toothed, or rarely entire.

Phyllaries with elongate, subulate, usually spreading, densely cinereous-puberulous, herbaceous tips_____**38. A. tephrodes.**

Phyllaries with shorter, rhombic or lanceolate, green tips, or these, if subulate, conspicuously glandular.

Leaves densely cinereous-puberulous.

Phyllaries canescent-puberulous, obscurely or not at all glandular.

43. A. canescens.

Phyllaries densely glandular, not canescent-puberulous.

44. A. leucanthemifolius.

Leaves green, not densely cinereous-puberulent.

Plant essentially glabrous throughout except for the obscurely puberulous phyllaries_____**39. A. leiodes.**

Plant more or less densely puberulous or glandular-hispidulous or hispid, the phyllaries densely glandular.

Stem more or less densely puberulous or hirtellous, scarcely or not at all glandular-hispidulous below the inflorescence.

42. A. rubrotinctus.

Stem densely glandular-hispidulous or glandular-hispid.

Plant stout and tall, 30 to 100 cm. high, densely glandular-hispid; involucre 1 to 1.5 cm. high, the phyllaries with long subulate reflexed tips_____**41. A. bigelovii.**

Plant slender, 60 cm. high or less, glandular-hispidulous; involucre less than 1 cm. high, the phyllaries with short, lanceolate or lance-subulate, usually appressed tips.

40. A. cichoriaceus.

Plants perennial.

Plants with thick, woody, nearly or quite simple taproots or erect caudices, and clusters of enlarged basal leaves; stems monocephalous, subscapose or with 2 or 3 leaves.

Phyllaries with abruptly spreading, lanceolate or linear-lanceolate, herbaceous tips_____**5. A. kingii.**

Phyllaries not with abruptly spreading, lanceolate or linear-lanceolate, herbaceous tips.

Heads small, the disk 5 to 6 mm. high, 8 to 10 mm. thick.

Stems naked above; involucre glandular and sparsely hispid-pilose.

6. A. watsoni.

Stems leafy throughout; involucre densely glandular, not hispid-pilose.

7. A. arenarioides.

Heads larger, the disk about 1 cm. high, 1.5 to 2 cm. thick.

Leaves strongly 3 or 5-nerved; achenes densely silky-villous.

8. A. andersonii.

Leaves not nervose; achenes glabrous, at least above.

9. A. alpigenus.

Plants without thick woody taproots or erect caudices or, if rarely with them, the stems uniformly and densely leafy.
Plants with woody branched caudices, or else stem suffrutescent below.
Plants glabrous, often glaucous.
Heads discoid; achenes silky---29. A. carnosus.
Heads radiate; achenes glabrous or sparsely pubescent.
Plant tall, usually spiny; involucre not glandular.
30. A. spinosus.
Plant low, about 20 cm. high, not spiny; involucre densely glandular---7. A. arenarioides.
Plants pubescent, at least on margin of leaves and phyllaries, often so throughout.
Heads large, the disk 1 to 3 cm. thick; leaves 2 cm. long or more.
Leaves spinulose-toothed---31. A. abatus.
Leaves entire.
Stem glabrous; leaves glabrous except on margin; phyllaries merely ciliolate---32. A. glabriusculus.
Stem pubescent; leaves pubescent on the faces; phyllaries pubescent on back.
Involucre 8 to 12 mm. high; disk 1.2 to 2 cm. thick.
33. A. xylorrhiza.
Involucre 13 to 15 mm. high; disk 2 to 3 cm. thick.
34. A. venustus.
Heads small, the disk 1 cm. high or less, 1.5 cm. thick or less; leaves small, 1 cm. long or less.
Leaves densely cinereous-hirtellous, not narrowed at base, not hispid-ciliate; rays violet; pappus double, the outer of short bristles or squamellae---25. A. scopulorum.
Leaves strigillose or hispidulous and often glandular, usually hispid-ciliate, at least the lower distinctly narrowed to base; rays white, turning reddish or purplish in age; pappus simple.
Leaves densely cinereous-strigillose, not obviously glandular or hispid-ciliate---26. A. bellus.
Leaves green, conspicuously glandular and hispid-ciliate.
Leaves all spatulate or linear-oblanceolate, the lower more broadly so---27. A. hirtifolius.
Upper leaves subulate or linear-subulate, the lowest narrowly spatulate or oblanceolate---28. A. leucelene.
Plants without woody branched caudices; stems not suffrutescent below.
Heads discoid---29. A. carnosus.
Heads radiate.
Phyllaries dry, chartaceous, without distinct herbaceous tips, but the tips sometimes colored or, in Nos. 23 and 23a, the outer sometimes obscurely greenish at apex.
Outer phyllaries (like the inner ones) acute or acuminate.
Leaves elliptic-oblong or elliptic-ovate, thin and membranaceous, 1.5 to 3.5 cm. wide---21. A. engelmanni.
Leaves lanceolate or lance-elliptic, firm, 5 to 15 mm. wide.
22. A. perelegans.

Outer phyllaries obtuse.
Involucre and branches of inflorescence not glandular-hirtellous_____23. **A. glaucodes.**
Involucre and branches of inflorescence glandular-hirtellous.
23a. A. glaucodes pulcher.
Phyllaries with distinct herbaceous tips.
Involucre and pedicels glandular or glandular-puberulous.
Plants stout; stem leaves broad, 1 to 4 cm. wide.
Leaves sessile, not clasping; stem glandular.
24. A. wasatchensis.
Leaves sessile, clasping; stem villous__**2. A. integrifolius.**
Plants slender; stem leaves narrow, 5 mm. wide or less.
Plant tall, 30 to 90 cm. high; stem glabrous below or merely glandular; lower leaves about 10 cm. long.
3. A. pauciflorus.
Plant low, 20 cm. high or less; stem hispidulous; lower leaves 3 cm. long or less__**4. A. campestris bloomeri.**
Involucre and pedicels not glandular or glandular-puberulous.
Middle stem leaves broad, 1 to 4 cm. wide, obovate, elliptic-obovate, or lance-obovate, with distinctly clasping base.
Stem rather densely pubescent; phyllaries puberulous on back.
Leaves sharply serrate or serrulate____**1. A. radulinus.**
Leaves entire_____**10. A. subgriseus.**
Stem glabrous or pubescent only in lines; phyllaries glabrous except for the ciliate margin.
Outer phyllaries narrowly lanceolate.
Stem glabrous below the inflorescence.
11. A. ciliomarginatus.
Stem pubescent in lines below the inflorescence.
20. A. foliaceus frondeus.
Outer phyllaries oblanceolate or obovate.
Outer phyllaries acute, scarcely or not broader than the inner_____**20a. A. foliaceus canbyi.**
Outer phyllaries obtuse or merely acutish, usually much broader than the inner__**20b. A. foliaceus burkei.**
Middle stem leaves lanceolate, elliptic-lanceolate, or linear-lanceolate, usually less than 1 cm. wide, if rarely broader and ovate or broadly elliptic then without clasping base.
Leaves elliptic, ovate-elliptic, oval-obovate, or oblong, 1.5 to 3.5 cm. wide.
Leaves serrate, thick, scabrous_____**1. A. radulinus.**
Leaves entire, thin, smooth_____**21. A. engelmanni.**
Leaves lanceolate to linear-lanceolate, usually less than 1 cm. wide.
Phyllaries pubescent or puberulous on the back, and (except in no. 4) tipped with a callous point.
Herbaceous tips of the phyllaries squarrose.
Stem strigose or strigillose.
Involucre scarcely or not at all graduated.
12. A. commutatus.
Involucre distinctly graduated.
12a. A. commutatus polycephalus.

Stem hispid or hirsutulous with spreading or reflexed hairs----------12b. **A. commutatus crassulus.**

Herbaceous tips of the phyllaries not squarrose.

Leaves less than 3 cm. long.

4. A. campestris bloomeri.

Leaves more than 3 cm. long.

Involucre slightly graduated, the phyllaries lanceolate or linear-lanceolate, acute or acuminate.

14. A. occidentalis.

Involucre strongly graduated, at least the outer phyllaries somewhat obovate-oblong or spatulate-lanceolate, obtuse or merely acutish.

Stem rather densely griseous or cinereous-pilose with more or less spreading hairs.

10. A. subgriseus.

Stem subglabrous or pubescent with appressed hairs----------**13. A. adscendens.**

Phyllaries glabrous except for the ciliate or ciliolate margin.

Involucre strongly graduated, at least the outer phyllaries spatulate-lanceolate or obovate-oblong, obtuse----------**13. A. adscendens.**

Involucre subequal or, if strongly graduated, the phyllaries linear or lance-linear, acute or acuminate, not at all spatulate or obovate.

Heads few, in a terminal, nearly naked corymb or corymbose panicle.

Involucre 3 to 4-seriate; stem leaves chiefly linear.

14. A. occidentalis.

Involucre about 2-seriate; stem leaves oblong-lanceolate to linear----------**15. A. fremonti.**

Heads numerous, in a leafy panicle.

Heads small, the disk 5 to 6 mm. high.

16. A. oregonus.

Heads larger, the disk 7 to 10 mm. high.

Involucre closely graduated in several series.

17. A. hesperius.

Involucre subequal, or some of the outermost phyllaries foliaceous and equaling the inner.

Middle leaves usually denticulate; outermost phyllaries not obviously wider than the inner----------**18. A. douglasii.**

Middle leaves entire; outermost phyllaries wider than the inner----------**19. A. eatoni.**

1. Aster radulinus A. Gray, Proc. Amer. Acad. **8**: 388. 1872.

Artemisia belt; Nevada, according to H. M. Hall. Washington to Nevada and California.

2. Aster integrifolius Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 291. 1840.
Aster amplexifolius Rydb. Mem. N. Y. Bot. Gard. **1**: 391. 1900.

Yellow pine, aspen, and spruce belts. Montana to Washington, California, and Colorado.

3. Aster pauciflorus Nutt. Gen. Pl. **2**: 154. 1818.
Aster thermalis Jones, Proc. Calif. Acad. II. **5**: 694. 1895.
Covillea and artemisia belts. Saskatchewan to Texas, Arizona, and Nevada.

4. Aster campestris bloomeri A. Gray, Syn. Fl. **1**²: 178. 1884.
Aster bloomeri A. Gray, Proc. Amer. Acad. **6**: 539. 1865.
Yellow pine belt. Nevada and California.

5. Aster kingii D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 141. *pl. 16, f. 1–6.* 1871.
Yellow pine, aspen, and spruce belts. Utah.

6. Aster watsoni A. Gray, Syn. Fl. **1**²: 201. 1884.
Aster glacialis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 142, in part. 1871. Not *A. glacialis* Nutt. 1841.
Asterigeron watsoni Rydb. Fl. Rocky Mount. 891. 1917.
Spruce belt. Nevada and Utah.

7. Aster arenarioides D. C. Eaton; A. Gray, Proc. Amer. Acad. **8**: 647. 1873.
Erigeron stenophyllum D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 152. *pl. 17, f. 8–16.* 1871. Not *E. stenophyllus* Hook. & Arn. 1836.
Erigeron arenarioides Rydb. Fl. Rocky Mount. 910. 1917.
Spruce belt. Utah.

8. Aster andersonii A. Gray, Proc. Amer. Acad. **7**: 352. 1868.
Erigeron andersonii A. Gray, Proc. Amer. Acad. **6**: 540. 1865.
Oreastrum andersonii Greene, Pittonia **3**: 147. 1896.
Oreostemma andersonii Greene, Pittonia **4**: 224. 1900.
Yellow pine, aspen, and spruce belts; Sierra Nevada. California and western Nevada.

9. Aster alpigenus (Torr. & Gray) A. Gray, Proc. Amer. Acad. **8**: 389. 1872.
Aplopappus alpigenus Torr. & Gray, Fl. N. Amer. **2**: 241. 1842.
Aster haydeni Porter in Hayden, Geol. Rep. Surv. Montana **1871**: 485. 1872.
Aster pulchellus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 143. *pl. 16, f. 7–14.* 1871. Not *A. pulchellus* Willd. 1800.
Oreastrum alpigenum Greene, Pittonia **3**: 147. 1896.
Oreostemma alpigenum Greene, Pittonia **4**: 224. 1897.
Oreostemma haydeni Greene, Pittonia **4**: 224. 1900.
Spruce and subalpine belts. Montana to Washington, southward to western Nevada.

10. Aster subgriseus Rydb. Fl. Rocky Mount. 884. 1917.
Aster griseus Greene, Leaflets **1**: 147. 1905. Not *A. griseus* Kuntze, 1891.
Spruce belt. Wyoming, Colorado, and Utah.

11. Aster ciliomarginatus Rydb. Mem. N. Y. Bot. Gard. **1**: 392. 1900.
Aster glastifolius Greene, Pittonia **4**: 218. 1900.
Yellow pine, aspen, and spruce belts. Montana to British Columbia, Utah, and Colorado.

12. Aster commutatus (Torr. & Gray) A. Gray, Syn. Fl. **1**²: 185. 1884.
Aster multiflorus commutatus Torr. & Gray, Fl. N. Amer. **2**: 125. 1841.
Aster incanopilosus Sheld. Bull. Torrey Club **20**: 286. 1893.
Artemisia, pinyon, and yellow pine belts. Minnesota to British Columbia, New Mexico, and Arizona. Not definitely known from our range.

12a. Aster commutatus polycephalus (Rydb.) Blake.

Aster polycephalus Rydb. Bull. Torrey Club **33**: 153. 1906.

Artemisia, pinyon, and yellow pine belts. Nebraska to Alberta, Arizona, and Texas. Not definitely known from our range.

12b. Aster commutatus crassulus (Rydb.) Blake.

Aster crassulus Rydb. Bull. Torrey Club **28**: 504. 1901.

Artemisia, pinyon, and yellow pine belts. North Dakota to Saskatchewan, California, and Utah.

13. Aster adscendens Lindl.; DC. Prodr. **5**: 231. 1836.

Aster denudatus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 292. 1840.

Aster adscendus denudatus Torr. & Gray, Fl. N. Amer. **2**: 111. 1841.

Aster nuttallii Torr. & Gray, Fl. N. Amer. **2**: 126. 1841.

Aster falcatus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 140. 1871. Not *A. falcatus* Lindl. 1836.

Aster menziesii A. Gray, Syn. Fl. **1**²: 190, in part, as to Nevada range (?). 1884.

Aster armeriaefolius Greene, Pittonia **4**: 214. 1900.

Aster nelsonii Greene, Pittonia **4**: 219. 1900.

?*Aster exsul* Greene, Pittonia **4**: 221. 1900.

Aster vallicola Greene, Pittonia **4**: 221. 1900.

Aster limoniifolius Greene, Pittonia **4**: 222. 1900.

Aster oxylepis Greene, Pittonia **4**: 223. 1900.

Aster halophilus Greene, Leaflets **2**: 8. 1909.

?*Aster leucopsis* Greene, Leaflets **2**: 8. 1909.

Yellow pine, aspen, and spruce belts. Saskatchewan to Washington, Nevada, and New Mexico.

14. Aster occidentalis (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 164. 1841.

Tripolium occidentale Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 296. 1840.

Aster aestivus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 141. 1871. Not *Aster aestivus* D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 141. 1871. Not *Aster occidentalis scabriusculus* A. Gray, Syn. Fl. 1²: 192. 1884.

Artemisia belt, upward to the spruce belt. Yukon to California and Colorado.

15. Aster fremonti (Torr. & Gray) A. Gray, Syn. Fl. **1**²: 191. 1884.

Aster adscendens fremonti Torr. & Gray, Fl. N. Amer. **2**: 503. 1843.

Spruce and subalpine belts. Alberta to British Columbia, California, and Colorado.

16. Aster oregonus (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 163, as *A. oreganus*. 1841.

Tripolium oregonum Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 296. 1840.

Aster simplex D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 140. 1871. Not *A. simplex* Willd. 1809.

Aster carneus subasper D. C. Eaton in King, U. S. Geol. Expl. 40th Par. **5**: 141. 1871. Not *A. carneus subasper* Torr. & Gray, 1841.

Yellow pine, aspen, and spruce belts. Montana to British Columbia, southward to Utah and Nevada.

17. Aster hesperius A. Gray, Syn. Fl. **1**²: 192. 1884.

Aster fluvialis Osterhout, Bull. Torrey Club **32**: 611. 1905.

Artemisia, pinyon, and yellow pine belts. Colorado to New Mexico, Utah, and California.

18. Aster douglasii Lindl. in DC. Prodr. **5: 239. 1836.**

?Aster limosus Greene, Pittonia **4:** 222. 1900.

Yellow pine belt. Montana to British Columbia, southward to Wyoming, Nevada, and California.

19. Aster eatoni (A. Gray) Howell, Fl. Northw. Amer. 310. 1900.

Aster foliaceus eatoni A. Gray, Syn. Fl. 1^2: 194. 1884.

Aster douglasii D. C. Eaton in King, Geol. Expl. 40th Par. **5:** 141, in part. 1871. Not *A. douglasii* Lindl. 1836.

Brachyactis hybrida Greene, Leaflets **1:** 147. 1905.

Yellow pine belt. Montana to British Columbia, Nevada, and Colorado.

20. Aster foliaceus frondeus A. Gray, Syn. Fl. 1^2: 193. 1884.

Aster adscendens parryi D. C. Eaton in King, Geol. Expl. 40th Par. **5:** 139, in part. 1871. Not *A. foliaceus parryi* A. Gray, 1884.

Aster douglasii D. C. Eaton in King, Geol. Expl. 40th Par. **5:** 141, in part. 1871.

Aster frondeus Greene, Proc. Acad. Phila. **1895:** 551. 1896.

Yellow pine, aspen, spruce, and subalpine belts. Alberta to British Columbia, Nevada, and Colorado.

20a. Aster foliaceus canbyi A. Gray, Syn. Fl. 1^2: 193. 1884.

Aster adscendens parryi D. C. Eaton in King, U. S. Geol. Expl. 40th Par. **5:** 139, in part. 1871.

Aster canbyi Vasey; A. Gray, Syn. Fl. 1^2: 193, as synonym. 1884; Rydb. Fl. Colo. 354, 356. 1906. Not *A. canbyi* Kuntze, 1891.

Spruce and subalpine belts. Idaho to New Mexico, Utah, and Nevada.

20b. Aster foliaceus burkei A. Gray, Syn. Fl. 1^2: 193. 1884.

Aster burkei Howell, Fl. Northw. Amer. 310. 1900. Not *A. burkei* Harv. 1864.

Aster majusculus Greene, Pittonia **4:** 215. 1900.

Spruce belt. British Columbia, southward to New Mexico and Arizona.

21. Aster engelmanni (D. C. Eaton) A. Gray, Syn. Fl. 1^2: 199. 1884.

Aster elegans engelmanni D. C. Eaton in King, Geol. Expl. 40th Par. **5:** 144. 1871.

Eucephalus engelmanni Greene, Pittonia **3: 54. 1896.**

Yellow pine, aspen, and spruce belts. Alberta to British Columbia, Nevada, and Colorado.

22. Aster perelegans Nels. & Macbr. Bot. Gaz. **56: 477. 1913.**

Eucephalus elegans Nutt. Trans. Amer. Phil. Soc. n. ser. **7:** 298. 1840.

Aster elegans Torr. & Gray, Fl. N. Amer. **2:** 159. 1841. Not *A. elegans* Willd. 1803.

Yellow pine, aspen, and spruce belts. Nebraska to Oregon and Nevada.

23. Aster glaucodes Blake, Proc. Biol. Soc. Washington **35: 174. 1922.**

Eucephalus glaucus Nutt. Trans. Amer. Phil. Soc. n. ser. **7: 299. 1840.**

Aster glaucus Torr. & Gray, Fl. N. Amer. **2:** 159. 1841. Not *A. glaucus* Nees, 1818.

Yellow pine, aspen, and spruce belts. Wyoming, Colorado, and Utah.

23a. Aster glaucodes pulcher Blake, Proc. Biol. Soc. Washington **35: 174. 1922.**

Artemisia, pinyon, and yellow pine belts. Utah and Arizona.

24. Aster wasatchensis (Jones) Blake.

Aster glaucus wasatchensis Jones, Proc. Calif. Acad. II. **5**: 694. 1895.
Eucephalus wasatchensis Rydb. Fl. Rocky Mount. 878. 1917.
Spruce belt. Utah.

25. Aster scopulorum A. Gray, Proc. Amer. Acad. **16**: 98. 1880.

Chrysopsis alpina Nutt. Journ. Acad. Phila. **7**: 34. *pl. 3, f. 2.* 1834. Not *A. alpinus* L. 1753.
Diplopappus alpinus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 304. 1840.
Ionactis alpina Greene, Pittonia **3**: 245. 1897.
Yellow pine belt. Montana to Oregon, southward to Wyoming and Nevada.

26. Aster bellus Blake, Proc. Biol. Soc. Washington **35**: 174. 1922.

Pinyon and yellow pine belts. Palmetto Range, Nevada, altitude 1,830 to 2,135 meters.

27. Aster hirtifolius Blake, nom. nov.

Diplopappus ericoides hirtellus A. Gray, Mem. Amer. Acad. n. ser. **4**: 69. 1849.
Diplopappus ericoides D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 147. 1871. Not *D. ericoides* Torr. & Gray, 1841.
Leucelene hirtella Rydb. Bull. Torrey Club **33**: 153. 1906. Not *A. hirtellus* Lindl. 1836.
Covillea, artemisia, pinyon, and yellow pine belts. Wyoming to Texas, Arizona, and Nevada.

28. Aster leucelene Blake, nom. nov.

Inula ericoides Torr. Ann. Lyc. N. Y. **2**: 212. 1828. Not *A. ericoides* L. 1753.
Eucephalus ericoides Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 299. 1840.
Diplopappus ericoides Torr. & Gray, Fl. N. Amer. **2**: 182. 1841.
Aster ericaefolius Rothr. Bot. Gaz. **2**: 70. 1877. Not *A. ericaefolius* Forsk. 1775.
Leucelene ericoides Greene, Pittonia **3**: 148. 1896.
Covillea and artemisia belts. Kansas to Texas and Mexico, westward to Colorado and Utah.

29. Aster carnosus A. Gray; Hemsl. Biol. Centr. Amer. Bot. **2**: 120. 1881.

Linosyris ? carnosa A. Gray, Pl. Wright. **2**: 80. 1853.
Bigelovia intricata A. Gray, Proc. Amer. Acad. **17**: 208. 1882.
Leucosyris carnosa Greene, Fl. Franc. 384. 1897.
Covillea belt. Nevada, Arizona, and California.

30. Aster spinosus Benth. Pl. Hartw. 20. 1839.

Leucosyris spinosa Greene, Pittonia **3**: 244. 1897.
Covillea belt. California and Nevada to Utah, Texas, and Costa Rica.

31. Aster abatus Blake, nom. nov.

Aplopappus tortifolius Torr. & Gray, Journ. Bost. Soc. Nat. Hist. **5**: 109. 1845.
Aster tortifolius A. Gray, Proc. Amer. Acad. **7**: 353. 1868. Not *A. tortifolius* Michx. 1803.
Aster mohavensis Coville, Contr. U. S. Nat. Herb. **4**: 126. 1893. Not *A. mohavensis* Kuntze, 1891.
Xylorrhiza tortifolia Greene, Pittonia **3**: 48. 1896.
Xylorrhiza lanceolata Rydb. Bull. Torrey Club **37**: 146. 1910. Not *Aster lanceolatus* Willd. 1803.
Covillea belt. California, Utah, and Nevada.

32. Aster glabriusculus (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 159. 1841.
Xylorrhiza glabriuscula Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 297. 1840.
Alkali plains. Wyoming and Utah.

33. Aster xylorrhiza Torr. & Gray, Fl. N. Amer. **2**: 158. 1841.
Xylorrhiza villosa Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 298. 1840. Not *A. villosus* Thunb. 1794–1800.
Xylorrhiza scopulorum A. Nels. Bot. Gaz. **37**: 270. 1904.
Artemisia and pinyon belts. Wyoming and Colorado, westward to Nevada.

34. Aster venustus Jones, Zoe **2**: 247. 1891.
Xylorrhiza venusta Heller, Muhlenbergia **1**: 8. 1900.
Artemisia belt. Colorado and Utah.

35. Aster parvulus Blake, nom. nov.
Machaeranthera parviflora A. Gray, Pl. Wright. **1**: 90. 1852.
Aster parviflorus A. Gray in Brewer & Wats. Bot. Calif. **1**: 322. 1876. Not *A. parviflorus* Nees, 1818.
Covillea and artemisia belts. Utah, New Mexico, and Arizona.

36. Aster tagetinus (Greene) Blake.
Machaeranthera tanacetifolia humilis A. Gray, Pl. Wright. **2**: 74. 1853.
Machaeranthera tagetina Greene, Pittonia **4**: 71. 1899.
Machaeranthera humilis Standl. Muhlenbergia **5**: 48. 1909.
Covillea belt. Utah, New Mexico, and Arizona.

37. Aster tanacetifolius H. B. K. Nov. Gen. & Sp. **4**: 95. 1820.
Machaeranthera tanacetifolia Nees, Gen. & Sp. Ast. 225. 1832.
Covillea and artemisia belts. South Dakota to Alberta, Nevada, and Mexico.

38. Aster tephrodes (A. Gray) Blake.
Dieteria asteroides Torr. in Emory, Mil. Reconn. 141. 1848. Not *Aster asteroides* MacM. 1892.
Machaeranthera canescens latifolia A. Gray, Pl. Wright. **2**: 75. 1853.
Aster canescens latifolius A. Gray, Syn. Fl. 1^2: 206. 1884. Not *A. latifolius* Mill. 1768.
Aster canescens tephrodes A. Gray, Syn. Fl. 1^2: 206. 1884.
Machaeranthera tephrodes Greene, Pittonia **4**: 24. 1899.
Machaeranthera verna A. Nels. Bot. Gaz. **37**: 267. 1904.
Artemisia, pinyon, and yellow pine belts. Nevada and California to New Mexico.

39. Aster leiodes Blake, nom. nov.
Machaeranthera canescens D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 146, in part. 1871. Not *M. canescens* A. Gray, 1852.
Machaeranthera laetevirens Greene, Pittonia **3**: 61. 1896. Not *A. laetevirens* Greene, 1900.
Artemisia belt. Nevada.

40. Aster cichoriaceus (Greene) Blake.
Aster canescens viridis A. Gray, Syn. Fl. 1^2: 206. 1884.
Machaeranthera rigida Greene, Pittonia **4**: 25. 1899. Not *A. rigidus* L. 1753.
Machaeranthera cichoriacea Greene, Leaflets **1**: 148. 1905.
Artemisia, pinyon, and yellow pine belts. Colorado, New Mexico, Utah, and Arizona.

41. Aster bigelovii A. Gray in U. S. Rep. Expl. Miss. Pacif. **4**: 97. *pl. 10.* 1857
Aster townshendii Hook. f. in Curtis's Bot. Mag. **105**: *pl. 6430.* 1879.

Machaeranthera aspera Greene, Pittonia **3**: 62. 1896.
Machaeranthera bigelovii Greene, Pittonia **3**: 63. 1896.
Yellow pine belt. Lake Tahoe; not definitely known as yet from Nevada or Utah. Colorado and New Mexico to California.

42. Aster rubrotinctus Blake, nom. nov.
Machaeranthera rubricaulis Rydb. Bull. Torrey Club **28**: 506. 1901. Not *Aster rubricaulis* Lam. 1783.
Machaeranthera latifolia A. Nels. Proc. Biol. Soc. Washington **20**: 38. 1907. Not *Aster latifolius* Mill. 1768.
Machaeranthera paniculata A. Nels. Proc. Biol. Soc. Washington **20**: 38. 1907. Not *Aster paniculatus* Mill. 1768.
Yellow pine belt. Colorado and Utah.

43. Aster canescens Pursh, Fl. Amer. Sept. 547. 1814.
Dieteria canescens Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 300. 1840.
Machaeranthera canescens A. Gray, Pl. Wright. **1**: 89. 1852.
Artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, California, and Colorado.

44. Aster leucanthemifolius Greene, Erythea **3**: 119. 1895.
Dieteria pulverulenta Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 300. 1840. Not *Aster pulverulentus* Kuntze, 1891.
Dieteria divaricata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 301. 1840. Not *Aster divaricatus* L. 1753.
Dieteria viscosa Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 301. 1840. Not *Aster viscosus* Labill. 1806.
Machaeranthera canescens D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 146, in part 1871. Not *Aster canescens* Pursh, 1814.
Aster canescens viscosus A. Gray, Syn. Fl. 1^2: 206. 1884.
Machaeranthera montana Greene, Pittonia **3**: 60. 1896. Not *Aster montanus* All. 1785.
Machaeranthera leucanthemifolia Greene, Pittonia **3**: 61. 1896.
Machaeranthera commixta Greene, Pittonia **4**: 71. 1899. Not *Aster commixtus* Kuntze, 1891.
Machaeranthera leptophylla Rydb. Bull. Torrey Club **37**: 147. 1910.
? *Aster canescens aristatus* Eastw. Proc. Calif. Acad. II. **6**: 296. 1896.
Artemisia, pinyon, and yellow pine belts. Montana to Colorado, westward to Nevada.

45. Aster brachyactis Blake, nom. nov.
Erigeron ciliatus Ledeb. Fl. Alt. **4**: 92. 1833. Not *Aster ciliatus* Walt. 1788.
Tripolium angustum Lindl. in Hook. Fl. Bor. Amer. **2**: 15. 1834.
Crinitaria ? humilis Hook. Fl. Bor. Amer **2**: 24. 1834. Not *Aster humilis* Willd. 1803.
Conyza altaica DC. Prodr. **5**: 380. 1836. Not *Aster altaicus* Willd. 1809.
Aster angustus Torr. & Gray, Fl. N. Amer. **2**: 162. 1841. Not *A. angustus* Nees, 1818.
Brachyactis angustus Britton; Britt. & Brown, Illustr. Fl. **3**: 383. 1898.
Artemisia belt. Wisconsin to Alberta, southward to Missouri and Utah.

46. Aster frondosus (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 165. 1841.
Tripolium frondosum Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 296. 1840.
Aster angustus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 144. 1871. Not *A. angustus* Torr. & Gray, 1841.
Artemisia belt. Wyoming and Utah, westward to Oregon and California.

16. ERIGERON L. Fleabane

Plants annual or biennial.
Rays inconspicuous, little exceeding the disk, white or rosy.
Heads very numerous, tiny, the involucre 3 mm. high; phyllaries strongly graduated—1. E. canadensis.
Heads solitary to numerous, larger, the involucre 5 to 8 mm. high; phyllaries slightly or not at all graduated.
Involucre hispidulous or hispid, not at all glandular; stem leaves linear, conspicuously ciliate, all but the uppermost equaling or exceeding the peduncles of the racemosely arranged heads; phyllaries merely acute—2. E. lonchophyllus.
Involucre glandular-puberulous, sometimes also hirsute at base; stem leaves lanceolate or linear-lanceolate, not conspicuously ciliate, much shorter than the peduncles or branches of the inflorescence; phyllaries acuminate.
Stems tall, 25 cm. high or more, many-headed; involucre glandular, sometimes sparsely hirsute at base—3. E. acris asteroides.
Stems low, usually 20 cm. high or less, the heads solitary or few; involucre copiously hirsute as well as glandular.
3a. E. acris debilis.
Rays conspicuous, much exceeding the disk, purple, violet, or white.
Heads few or solitary, large, the disk 1 cm. wide or more.
12. E. glabellus.
Heads usually numerous, small, the disk usually less than 1 cm. wide.
Plants strigose or strigillose.
Plants tall, 30 cm. high or more, leafy-stemmed, without runners.
4. E. strigosus.
Plant low, 25 cm. high or less, the leaves chiefly basal, those of stem few and small; prostrate runners or rooting stems present.
5. E. flagellaris.
Plants densely pubescent with spreading hairs.
Pappus simple, of bristles without outer squamellae.
6. E. bellidiastrum.
Pappus double, the inner of bristles, the outer of short squamellae.
Plants with earliest heads on scapiform nearly naked peduncles; plant later producing runner-like branches—7. E. nudiflorus.
Plants leafy-stemmed from the first, often diffuse but without definite runner-like branches—8. E. divergens.
Plants perennial by rootstocks or woody caudices.
Stem leaves comparatively broad, ovate to lanceolate; plants usually 30 cm. high or more; heads solitary or few, rarely numerous, large, the disk more than 1 cm. wide.
Rays broad, more than 1 mm. wide; pappus simple; phyllaries loose above.
Phyllaries villous with many-celled black-based hairs.
9. E. coulteri.
Phyllaries glandular-puberulent.
Stem leaves broadly ovate or oblong to ovate-lanceolate.
10. E. salsuginosus.
Stem leaves lanceolate to linear.
10a. E. salsuginosus angustifolius.
Rays narrow, usually less than 1 mm. wide; pappus usually double; phyllaries appressed except at extreme tip (except in *E. elatior*).

Involucre densely long-pilose with many-celled loose whitish hairs; phyllaries very loose----------11. E. elatior.
Involucre not densely long-pilose; phyllaries appressed except at tip.
Phyllaries densely hirsute or hispid, sometimes also glandular.
Phyllaries hirsute, not glandular----------12. E. glabellus.
Phyllaries densely glandular-puberulous as well as hirsute.
13. E. subtrinervis.
Phyllaries densely glandular-puberulent, sometimes also with a few hairs.
Stem densely glandular-puberulous nearly or quite to base, sometimes also hirsute----------14. E. viscidus.
Stem glabrous or sparsely hirsute, except in the inflorescence.
Stem leaves not ciliate----------15. E. eximius.
Stem leaves conspicuously ciliate.
Involucre sparsely hirsute as well as glandular; upper leaves narrowly lanceolate----------16. E. speciosus.
Involucre glandular, not hairy; upper leaves chiefly ovate or elliptic-ovate----------17. E. macranthus.
Stem leaves narrow, chiefly linear, often reduced or none; plants often low; heads smaller, the disk rarely 1 cm. wide.
Leaves dissected or deeply cut.
Leaves pinnately divided, the lobes often again toothed or cleft. Heads discoid----------18. E. pinnatisectus insolens.
Leaves once to thrice ternately divided.
Leaves 3 or 5-lobed at summit, the lobes entire or sometimes 2 or 3-lobed----------19. E. trifidus.
Leaves twice or thrice ternately divided.
Heads radiate----------20. E. compositus.
Heads discoid----------20a. E. compositus incertus.
Leaves entire or rarely slightly dentate.
Involucre densely villous with many-celled soft spreading hairs. Plants low, usually about 10 cm. high; stems subscapose, monocephalous.
Involucre villous with black or purple-black hairs.
21. E. melanocephalus.
Involucre villous with white or whitish hairs------22. E. uniflorus.
Involucre strigose, hispid, or glandular, not densely villous.
Stem pubescent, usually densely so, with wide-spreading or rarely reflexed hairs.
Leaves essentially uniform throughout, sessile, linear or narrowly spatulate, not narrowed to distinct petioliform bases; plants usually about 30 cm. high----------23. E. breweri.
Leaves not uniform, the basal much longer and narrowed to distinct petioliform bases; plants usually low.
Plant scapose or nearly so, 10 cm. high or usually less; stem leaves reduced, only 2 or 3. Heads solitary.
Pappus without outer squamellae----------24. E. vetensis.
Pappus with conspicuous paleaceous outer squamellae.
31. E. concinnus.
Plants when well developed leafy-stemmed and several-headed, more than 10 cm. high; in depauperate individuals sometimes smaller and monocephalous, but then with several stem leaves.
Rays very narrow and erect, little exceeding the disk, pink.
3a. E. acris debilis.

Rays spreading, conspicuous, much longer than the disk, not pink, or else entirely absent.
Basal leaves oblanceolate or spatulate-oblanceolate to obovate, obtuse or merely acutish.
Stem glandular-puberulent, sparsely or not at all hispid. **25. E. nauseosus.**
Stem densely hispidulous or short-hirsute.
Basal leaves triplinerved; rays white or lavender-tinged, rarely wanting.
Heads radiate; involucre densely hirsutulous or hirsute. **26. E. caespitosus.**
Heads discoid; involucre densely glandular. **26a. E. caespitosus anactis.**
Basal leaves 1-nerved; rays purple. Involucre glandular-puberulous and rather sparsely hirsutulous. **27. E. asperugineus.**
Basal leaves narrowly linear-oblanceolate to linear-spatulate or linear, acute or acuminate.
Plants usually tall, 30 cm. high or more; basal leaves strongly 3-nerved, 10 cm. long or more. Rays violet. **28. E. corymbosus.**
Plants 30 cm. high or usually less; basal leaves 1-nerved or weakly triplinerved.
Outer pappus inconspicuous, of narrow lanceolate or bristle-form squamellae---------- **29. E. pumilus.**
Outer pappus conspicuous, of broad often concrete squamellae.
Involucre nearly glabrous---------- **30. E. brandegei.**
Involucre densely hirsute.
Heads radiate---------- **31. E. concinnus.**
Heads discoid-------- **31a. E. concinnus aphanactis.**
Stem pubescent with appressed or ascending hairs, or subglabrous.
Rays yellow or wanting.
Rays yellow---------- **32. E. peucephyllus.**
Rays none.
Heads corymbose; stem 30 cm. high or more, leafy throughout. **33. E. inornatus.**
Heads solitary; stems low, leafy chiefly at base. **34. E. bloomeri.**
Rays present, white or violet.
Heads several, corymbed. Plants comparatively tall, 20 cm. high or more, leafy-stemmed; stem and leaves densely cinereous-strigose.
Achenes flat, 2-nerved, strigillose; leaves nearly filiform. **35. E. filifolius.**
Achenes somewhat quadrangular, densely silky-pubescent; leaves very narrowly linear-oblanceolate or linear. **36. E. utahensis.**
Heads solitary or 2 or, if several, plant either low or not densely cinereous-strigose.
Stem and leaves densely silvery-strigillose; stems monocephalous, leafy, usually 20 to 30 cm. high--- **37. E. argentatus.**

Stem and leaves not densely silvery-strigillose or, if rarely subargenteous, the plant subscapose.
Plant with prostrate leafy runners, often rooting at the tip----------5. E. flagellaris.
Plant without prostrate leafy runners, but stems sometimes decumbent at base.
Basal leaves lanceolate or oblanceolate, rarely linear-oblanceolate, strongly 3-nerved, acuminate, much exceeding the stem leaves.
Disk 7 to 11 mm. high; involucre subequal, densely hispid-pilose, not obviously glandular--38. E. nevadincola.
Disk 5 to 8 mm. high; involucre more or less graduated, glandular-puberulous and hispid-pilose--39. E. eatoni.
Basal leaves linear-spatulate to spatulate or obovate, 1-nerved (very rarely 3-nerved), obtuse or acute, rarely acuminate.
Leaves glabrous or only sparsely pubescent, chiefly on the margin.
Heads small, the disk about 5 mm. high, 10 mm. wide; involucre distinctly graduated, glandular-puberulous, not strigose or hirsute----40. E. leiomerus.
Heads larger, the disk 6 to 8 mm. high, 12 to 15 mm. wide; involucre less graduated, usually strigillose or hirsute as well as glandular.
Stem essentially naked, the leaves nearly all basal chiefly cuneate-oblanceolate or obovate, obtuse or rounded.

41. E. controversus.

Stems leafy, the leaves usually acute or acuminate.
Involucre densely glandular, nearly or quite without eglandular hairs.

10a. E. salsuginosus angustifolious.

Involucre rather densely hirsute as well as glandular----42. E. ursinus.
Leaves densely pubescent.
Blades of the basal leaves chiefly elliptic, acute at each end, usually much shorter than the petioles; involucre glandular-puberulous, usually also sparsely hirsute----43. E. tener.
Blades of the basal leaves linear-spatulate to oblanceolate, usually equaling or longer than the petioles; involucre rather densely hirsute or hirsutulous, sometimes also glandular.
Plants scapose or subscapose, the stems essentially naked for half their length or more.
Leaves essentially linear, very densely tufted, less than 2 cm. long; rays white; stem about 3 cm. high----44. E. compactus.
Leaves spatulate, about 3 cm. long; rays violet; stem about 15 cm. high. Plant with numerous assurgent leafy sterile branches.

45. E. pygmaeus.

Plants nearly always leafy-stemmed. Caudex without numerous assurgent sterile leafy branches.
Basal leaves narrowly linear-spatulate, at least the petioles with some coarse spreading hairs. Involucre hirsute, as well as glandular-puberulous.
46. E. engelmanni.
Basal leaves oblanceolate or spatulate-oblanceolate, the hairs all appressed, or at least not coarse and spreading.
Stems 20 cm. high or more, leafy; larger basal leaves triplinerved; heads usually several.
26b. E. caespitosus laccoliticus.
Stems 10 cm. high or less, sparsely leafy; basal leaves 1-nerved; heads solitary.
47. E. peasei.

1. Erigeron canadensis L. Sp. Pl. 863. 1753.
Leptilon canadense Britton; Britt. & Brown, Illustr. Fl. 3: 391. 1898.
Waste places. Nearly throughout North America as a weed.

2. Erigeron lonchophyllus Hook. Fl. Bor. Amer. 2: 18. 1834.
Erigeron glabratus minor Hook. Fl. Bor. Amer. 2: 18. 1834.
Erigeron arnerifolius Turcz. in DC. Prodr. 5: 291. 1836.
Erigeron racemosus Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 312. 1840.
Erigeron minor Rydb. Bull. Torrey Club 24: 295. 1897.
Yellow pine, aspen, and spruce belts. Saskatchewan to British Columbia, Nevada, and Colorado.

3. Erigeron acris asteroides (Andrzej.) DC. Prodr. 5: 290. 1836.
Erigeron droebachensis O. F. Muell. Fl. Dan. 5: *pl.* 874. 1782.
Erigeron asteroides Andrzej.; Besser, Enum. Pl. 33. 1822.
Erigeron acris droebachensis Blytt, Norges Fl. 1: 562. 1874.
Erigeron acris D. C. Eaton in King, Geol. Expl. 40th Par. 5: 149. 1871. Not *E. acris* L. 1753.
Yellow pine, aspen, and spruce belts. Quebec to Alaska, southward to New Brunswick, Michigan, Colorado, and Utah.

3a. Erigeron acris debilis A. Gray, Syn. Fl. 1^2: 220. 1884.
Erigeron jucundus Greene, Pittonia 2: 165. 1897.
Erigeron debilis Rydb. Mem. N. Y. Bot. Gard. 1: 408. 1900.
Yellow pine, aspen, spruce, and subalpine belts. Montana to British Columbia, southward to Utah.

4. Erigeron strigosus Muhl.; Willd. Sp. Pl. 3: 1956. 1804. DAISY FLEABANE.
Doronicum ramosum Walt. Fl. Carol. 205. 1788.
Erigeron ramosus B. S. P. Prel. Cat. N. Y. 27. 1888. Not *E. ramosus* Raf. 1817.
Artemisia belt. Nova Scotia to British Columbia, California, and Florida. Not seen from Utah and Nevada, but included on general range.

5. Erigeron flagellaris A. Gray, Mem. Amer Acad. n. ser. 4: 68. 1849.
Yellow pine, aspen, spruce, and subalpine belts. South Dakota to Wyoming, New Mexico, and Texas.

6. Erigeron bellidiastrum Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 307. 1840.
Erigeron cinereus aridus Jones, Proc. Calif. Acad. II. 5: 695. 1895.
Artemisia belt, upward to the spruce belt. South Dakota to Texas, Arizona, and Nevada.

7. Erigeron nudiflorus Buckley, Proc. Acad. Phila. **1861**: 456. 1862.
Erigeron cinereus A. Gray, Mem. Amer. Acad. n. ser. **4**: 68. 1849. Not *E. cinereus* Hook. & Arn. 1836.
Erigeron divergens cinereus A. Gray, Pl. Wright. **1**: 91. 1852.
Erigeron commixtus Greene, Pittonia **5**: 58. 1902.
Erigeron colo-mexicanus A. Nels. in Coulter, New Man. Rocky Mount. 529. 1909.
Artemisia, pinyon, and yellow pine belts. Colorado and Utah to Mexico.

8. Erigeron divergens Torr. & Gray, Fl. N. Amer. **2**: 175. 1841.
Erigeron bellidiastrum D. C. Eaton, U. S. Geol. Expl. 40th. Par. **5**: 150. 1871. Not *E. bellidiastrum* Nutt. 1841.
Erigeron wootoni Rydb. Bull. Torrey Club **33**: 153. 1906.
Erigeron lavandulaceus Greene, Leaflets **2**: 214. 1912.
Artemisia, pinyon, and yellow pine belts. Montana to British Columbia, California, and Texas.

9. Erigeron coulteri Porter in Porter & Coult. Fl. Colo. 61. 1874.
Erigeron frondeus Greene, Fl. Franc. 387. 1897.
Erigeron lucidus Greene, Leaflets **2**: 211. 1912.
Yellow pine, aspen, and spruce belts. Colorado to Nevada and California.

10. Erigeron salsuginosus (Richards.) A. Gray, Proc. Amer. Acad. **16**: 93. 1880.
Aster salsuginosus Richards. Bot. App. Franklin Journ. 748. 1823.
Aster glacialis Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 291. 1840.
Erigeron salsuginosus glacialis A. Gray, Syn. Fl. 1^2: 209. 1884.
Erigeron membranaceus Greene, Pittonia **3**: 294. 1898.
Erigeron callianthemus Greene, Leaflets **2**: 197. 1912.
Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to Alaska, California, and New Mexico.

10a. Erigeron salsuginosus angustifolius A. Gray, Proc. Amer. Acad. **16**: 93. 1880.
Erigeron angustifolius Rydb. Bull. Torrey Club **24**: 295. 1897. Not *E. angustifolius* Phil. 1894.
Yellow pine, aspen, spruce, and subalpine belts. Nevada and California to Washington.

11. Erigeron elatior (A. Gray) Greene, Pittonia **3**: 163. 1897.
Erigeron grandiflorus elatior A. Gray, Amer. Journ. Sci. II. **33**: 237. 1862.
? *Erigeron grandiflorum* D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 148. 1871. Not *E. grandiflorum* Hook. 1834.
Spruce and subalpine belts. Wyoming to Colorado and Utah.

12. Erigeron glabellus Nutt. Gen. Pl. **2**: 147. 1818.
Erigeron oblanceolatus Rydb. Bull. Torrey Club **24**: 294. 1897.
Erigeron fruticetorum Rydb. Fl. Rocky Mount. 906. 1917.
Yellow pine belt, upward to the alpine belts. Wisconsin to Saskatchewan, Utah, and New Mexico.

13. Erigeron subtrinervis Rydb. Mem. Torrey Club **5**: 328. 1894.
Erigeron glabellus mollis A. Gray, Proc. Acad. Phil. **1863**: 64. 1864.
Erigeron formosissimus Greene, Bull. Torrey Club **25**: 121. 1898.
Erigeron conspicuus Rydb. Mem. N. Y. Bot. Gard. **1**: 400. 1900.
Yellow pine, aspen, and spruce belts. South Dakota to Washington, Utah, and New Mexico.

14. Erigeron viscidus Rydb. Bull. Torrey Club **28**: 24. 1901.

Erigeron macranthum D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 150, in part. 1871. Not *E. macranthus* Nutt. 1840.

Erigeron smithii Rydb. Bull. Torrey Club **32**: 125. 1905.

Erigeron iodanthus Greene, Leaflets **2**: 209. 1912.

Erigeron hirtuosus Greene, Leaflets **2**: 209. 1912.

Spruce and subalpine belts. Colorado, New Mexico, Utah, and Arizona.

15. Erigeron eximius Greene, Pittonia **3**: 295. 1898.

Erigeron superbus Greene; Rydb. Colo. Agr. Exp. Sta. Bull. **100**: 361, 364. 1906.

Yellow pine, aspen, spruce, and subalpine belts. Wyoming, Colorado, and Utah.

16. Erigeron speciosus (Lindl.) DC. Prodr. **5**: 284. 1836.

Stenactis speciosus Lindl. in Edwards's Bot. Reg. **17**: *pl. 1577*. 1833.

Yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to Colorado and Utah.

17. Erigeron macranthus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 310. 1840.

Erigeron leiophyllus Greene, Leaflets **2**: 218. 1912.

Yellow pine, aspen, and spruce belts. Alberta and British Columbia, southward to New Mexico and Arizona.

18. Erigeron pinnatisectus insolens Macbr. & Payson, Contr. Gray Herb. n. ser. **49**: 79. 1917.

Erigeron mancus Rydb. Fl. Rocky Mount. 902. 1917.

Spruce and subalpine belts. Utah.

19. Erigeron trifidus Hook. Fl. Bor. Amer. **2**: 17. 1834.

Erigeron compositus trifidus A. Gray, Proc. Amer. Acad. **16**: 90. 1880.

Alpine belts. Alberta to Alaska, Utah, and Colorado.

20. Erigeron compositus Pursh, Fl. Amer. Sept. 535. 1814.

Erigeron multifidus Rydb. Mem. N. Y. Bot. Gard. **1**: 402. 1900.

Erigeron compositus multifidus Macbr. & Payson, Contr. Gray Herb. n. ser. **49**: 75. 1917.

Spruce and alpine belts. Greenland to Alaska, southward to Colorado and California.

20a. Erigeron compositus incertus A. Nels in Coulter, New Man. Rocky Mount. 528. 1909.

Erigeron compositus discoideus A. Gray, Syn. Fl. 1^2: 211, in part. 1884.

Erigeron multifidus incertus A. Nels. Bot. Gaz. **30**: 198. 1900.

Erigeron compositus petraeus Macbr. & Payson, Contr. Gray Herb. n. ser. **49**: 76. 1917.

Spruce and alpine belts. Alberta and British Columbia to Utah and Wyoming.

21. Erigeron melanocephalus A. Nels. Bull. Torrey Club **26**: 246. 1899.

Alpine belt. Wyoming to New Mexico and Utah.

22. Erigeron uniflorus L. Sp. Pl. 864. 1753.

Erigeron simplex Greene, Fl. Franc. 387. 1897.

Erigeron leucotrichus Rydb. Bull. Torrey Club **28**: 23. 1901.

Spruce and alpine belts. Arctic America to New Mexico and California. Also in the Old World.

23. Erigeron breweri A. Gray, Proc. Amer. Acad. **6**: 541. 1866.
Erigeron petrocallis Greene, Erythea **3**: 21. 1895.
Erigeron porphyreticus Jones, Contr. West. Bot. **8**: 33. 1898.
Erigeron aequifolius H. M. Hall, Univ. Calif. Publ. Bot. **6**: 174. 1915.
Yellow pine, aspen, and spruce belts; Sierra Nevada. California and western Nevada.

24. Erigeron vetensis Rydb. Bull. Torrey Club **32**: 126. 1905.
Erigeron radicatus A. Gray, Syn. Fl. 1²: 211. 1884, in part.
Yellow pine, aspen, and spruce belts. Montana to Colorado and Nevada.

25. Erigeron nauseosus (Jones) A. Nels. Bot. Gaz. **37**: 270. 1904.
Erigeron caespitosus nauseosus Jones, Proc. Calif. Acad. II. **5**: 696. 1895.
Yellow pine belt. Utah.

26. Erigeron caespitosus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 307. 1840.
Yellow pine, aspen, and spruce belts. Saskatchewan to Alaska, southward to Colorado and Nevada.

26a. Erigeron caespitosus anactis Blake, Proc. Biol. Soc. Washington **35**: 175. 1922.
Mt. Irish, Nevada.

26b. Erigeron caespitosus laccoliticus Jones, Proc. Calif. Acad. II. **5**: 696. 1895.
Diplopappus canescens Hook. Fl. Bor. Amer. **2**: 31. 1833.
Erigeron canescens Torr. & Gray, Fl. N. Amer. **2**: 179. 1841. Not *E. canescens* Hook. & Arn. 1836.
Erigeron subcanescens Rydb. Bull. Torrey Club **24**: 294. 1897.
Artemisia and pinyon belts. Saskatchewan to British Columbia, Utah, and Colorado.

27. Erigeron asperugineus (D. C. Eaton) A. Gray, Proc. Amer. Acad. **16**: 91. 1880.
Aster asperugineus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 142. 1871.
Erigeron elkoensis Nels. & Macbr. Bot. Gaz. **55**: 382. 1913.
Yellow pine, aspen, and spruce belts. Montana to Wyoming and Nevada.

28. Erigeron corymbosus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 308. 1840.
Erigeron nelsonii Greene, Pittonia **3**: 294. 1898.
On plains. Montana to British Columbia, southward to Nevada and California.

29. Erigeron pumilus Nutt. Gen. Pl. **2**: 147. 1818.
Artemisia, pinyon, and yellow pine belts. North Dakota to Saskatchewan and British Columbia, southward to Utah.

30. Erigeron brandegei A. Gray. Syn. Fl. 1²: 210. 1884.
On plains. Southwestern Colorado and southeastern Utah.

31. Erigeron concinnus (Hook. & Arn.) Torr. & Gray, Fl. N. Amer. **2**: 174. 1841.
Distasis ? concinna Hook. & Arn. Bot. Beechey Voy. 350. 1840.
Erigeron concinnus condensatus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 151. 1871.
Erigeron condensatus Greene, Bull. Torrey Club **24**: 511. 1897.
Erigeron wyomingensis A. Nels. Bull. Torrey Club **26**: 248. 1899.
Erigeron nanus Rydb. Fl. Rocky Mount. 904, in part, 1917. Not *E. nanum* Nutt. 1841 ?
Artemisia, pinyon, and yellow pine belts. Montana to British Columbia, southward to New Mexico and California.

31a. Erigeron concinnus aphanactis A. Gray, Proc. Amer. Acad. **6**: 540. 1865.
Erigeron aphanactis Greene, Fl. Franc. 389. 1897.
Artemisia belt. Utah to California.

32. Erigeron peucephyllus A. Gray, Proc. Amer. Acad. **16**: 89. 1880.
Erigeron filifolius Piper, Contr. U. S. Nat. Herb. **11**: 567. 1906. Not *E. filifolius* Nutt. 1841.
Artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, southward to Nevada and California.

33. Erigeron inornatus A. Gray, Proc. Amer. Acad. **16**: 88. 1880.
Erigeron douglasii eradiatus A. Gray in U. S. Rep. Expl. Miss. Pacif. **12**: 52. 1860.
Erigeron foliosus inornatus A. Gray, Bot. Calif. **1**: 330. 1876.
Erigeron eradiatus Piper, Contr. U. S. Nat. Herb. **11**: 568. 1906.
Yellow pine belt. Washington to California and Nevada.

34. Erigeron bloomeri A. Gray, Proc. Amer. Acad. **6**: 540. 1865.
Erigeron filifolius bloomeri A. Nels. Bot. Gaz. **54**: 413. 1912.
Artemisia, pinyon, and yellow pine belts. Oregon and Idaho, southward to California and Nevada.

35. Erigeron filifolius (Hook.) Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 308. 1840.
Diplopappus filifolius Hook. Fl. Bor. Amer. **2**: 21. 1834.
Artemisia belt. Montana to British Columbia, California, and Nevada.

36. Erigeron utahensis A. Gray, Proc. Amer. Acad. **16**: 89. 1880.
Erigeron stenophyllus tetrapleurus A. Gray, Proc. Amer. **8**: 650. 1873.
Erigeron sparsifolius Eastw. Proc. Calif. Acad. II. **6**: 297. 1896.
Erigeron tetrapleurus Heller, Bull. Torrey Club **25**: 628. 1898.
Wyomingia vivax A. Nels. Bot. Gaz. **56**: 70. 1913.
Artemisia belt. Utah and Arizona.

37. Erigeron argentatus A. Gray, Proc. Amer. Acad. **8**: 649. 1873.
Erigeron caespitosus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 153, in part. 1871. Not *E. caespitosus* Nutt. 1840.
Wyomingia argentata A. Nels. in Coulter, New Man. Rocky Mount. 531. 1909.
Artemisia belt. Montana to Colorado and Nevada.

38. Erigeron nevadincola[8] Blake, Proc. Biol. Soc. Washington **35**: 78. 1922.
Erigeron nevadensis A. Gray, Proc. Amer. Acad. **8**: 649. 1873. Not *E. nevadensis* Wedd. 1857.
Artemisia, pinyon, and yellow pine belts. Utah, Nevada, and California.

39. Erigeron eatoni A. Gray, Proc. Amer. Acad. **16**: 91. 1880.
Erigeron ochroleucus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 152. 1871. Not *E. ochroleucus* Nutt. 1841.
Erigeron caespitosus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 153, in part. 1871. Not *E. caespitosus* Nutt. 1841.
Erigeron decumbens A. Gray, Syn. Fl. 1²: 215, as to our range. 1884. Not *E. decumbens* Nutt. 1841.
Yellow pine, aspen, and spruce belts. Oregon to Wyoming and Utah.

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[8] *Erigeron sonnei* Greene, Pittonia **1**: 218. 1888, from the Washoe Mountains, Nevada, is apparently related to this species, but the description is incomplete and no material has been available for examination.

40. Erigeron leiomerus A. Gray, Syn. Fl. 1²: 211. 1884.

Aster glacialis D. C. Eaton in King, Geol. Expl. 40th Par. 5: 142, in part. 1871. Not *A. glacialis* Nutt. 1840.

Erigeron spathulifolius Rydb. Bull. Torrey Club 26: 545. 1899.

Erigeron minusculus Greene, Leaflets 2: 8. 1909.

Erigeron garrettii A. Nels. in Coulter, New Man. Rocky Mount. 526. 1909.

Yellow pine belt, upward to the alpine belt. Alberta to New Mexico and Nevada.

41. Erigeron controversus Greene, Leaflets 2: 206. 1912.

Aster salsuginosus scaposus D. C. Eaton in King, Geol. Expl. 40th Par. 5: 143. 1871.

Yellow pine, aspen, spruce, and subalpine belts. Utah.

42. Erigeron ursinus D. C. Eaton in King, Geol. Expl. 40th Par. 5: 148. 1871.

Yellow pine, aspen, spruce, and subalpine belts. Montana and Idaho to Colorado and Utah.

43. Erigeron tener A. Gray, Proc. Amer. Acad. 16: 91. 1880.

Erigeron caespitosus D. C. Eaton in King, Geol. Expl. 40th Par. 5: 153, in part. 1871. Not *E. caespitosus* Nutt. 1840.

Erigeron caespitosus tenerus A. Gray, Bot. Calif. 1: 328. 1876.

Yellow pine, aspen, and spruce belts. Montana and Idaho to Nevada and California.

44. Erigeron compactus Blake, Proc. Biol. Soc. Washington 22: 78. 1922.

Erigeron pulvinatus Rydb. Fl. Rocky Mount. 911. 1917. Not *E. pulvinatus* Wedd. 1857.

Artemisia belt. Utah.

45. Erigeron pygmaeus (A. Gray) Greene, Fl. Franc. 390. 1897.

Erigeron nevadensis pygmaeus A. Gray, Proc. Amer. Acad. 8: 649. 1873.

Spruce belt; Sierra Nevada of California. Not yet found in Nevada, but confidently to be expected.

46. Erigeron engelmanni A. Nels. Bull. Torrey Club 26: 247. 1899.

Erigeron simulans Greene, Pl. Baker. 3: 31. 1901.

Yellow pine belt. Montana and Idaho to Utah and Colorado.

47. Erigeron peasei Rydb. Bull. Torrey Club 32: 126. 1905.

Yellow pine belt. Colorado and Utah.

17. ESCHENBACHIA Moench

1. Eschenbachia coulteri (A. Gray) Rydb. Bull. Torrey Club 33: 154. 1906.

Conyza coulteri A. Gray, Proc. Amer. Acad. 7: 355. 1868.

Covillea and artemisia belts. Colorado to California, Mexico, and Texas.

18. BACCHARIS L.

Plants low, 60 cm. high or less, woody only at base; leaves small, linear or subulate. Involucre of female heads 6 to 9 mm. high; pappus brownish, at maturity about 12 mm. long ..... 1. B. wrightii.

Plants frutescent or suffrutescent, 1 to 5 meters high; leaves larger.

Leaves few, small, soon deciduous; plant broomlike. Pappus short, 4 mm. long ..... 2. B. sergiloides.

Leaves numerous, medium-sized, persistent; plant not broomlike.
Pappus of female flowers at maturity much exceeding the styles.
3. B. emoryi.
Pappus of female flowers merely equaling the styles at maturity.
Heads in small clusters terminating numerous short lateral branches.
4. B. viminea.
Heads in a terminal panicle 5. B. glutinosa.

1. **Baccharis wrightii** A. Gray, Pl. Wright. 1: 101. 1852.
Covillea, artemisia, pinyon, and yellow pine belts; near Flagstaff, Arizona. Kansas to Arizona and Mexico.

2. **Baccharis sergiloides** A. Gray in Torr. U. S. & Mex. Bound. Bot. 83. 1859.
Covillea belt. Southwestern Utah and Nevada, southern California, and Arizona.

3. **Baccharis emoryi** A. Gray in Torr. U. S. & Mex. Bound. Bot. 83. 1859.
Covillea and artemisia belts. Utah and Nevada to Texas and southern California.
Baccharis salicina Torr. & Gray, a closely related species, has been reported from Utah, but no specimens have been seen by the writer.

4. **Baccharis viminea** DC. Prodr. 5: 400. 1836.
Covillea belt. Southwestern Utah, Nevada, and California.

5. **Baccharis glutinosa** Pers. Syn. Pl. 2: 425. 1807.
Covillea belt. Colorado to California, Texas, Mexico, and South America.

19. PLUCHEA Cass.

Plant a glandular-puberulous annual; leaves ovate, serrate, mostly petioled, 5 to 10 cm. long; pappus of all the flowers similar, setaceous without dilated tips 1. P. camphorata.
Plant a silky-pubescent shrub up to 3 meters high; leaves elliptic to linear-lanceolate, entire, mostly sessile, 1 to 4.5 cm. long; pappus bristles of hermaphrodite flowers with clavellate tips 2. P. sericea.

1. **Pluchea camphorata** (L.) DC. Prodr. 5: 452. 1836.
Erigeron camphoratum L. Sp. Pl. ed. 2. 1212. 1763.
Covillea belt; Watkins Ranch, Ash Meadows, Nevada. Massachusetts to California, on the coast.

2. **Pluchea sericea** (Nutt.) Coville, Contr. U. S. Nat. Herb. 4: 128. 1893.
Polypappus sericeus Nutt. Journ. Acad. Phila. n. ser. 1: 178. 1847.
Tessaria borealis A. Gray, Mem. Amer. Acad. n. ser. 4: 75. 1849.
Pluchea borealis A. Gray, Proc. Amer. Acad. 17: 212. 1882.
Berthelotia sericea Rydb. Bull. Torrey Club 33: 154. 1906.
Covillea belt. Southwestern Utah to California, Mexico, and Texas.

20. STYLOCLINE Nutt.

1. **Stylocline micropoides** A. Gray, Pl. Wright. 2: 84. 1853.
Covillea belt. Southwestern Utah to southern California, Arizona, and New Mexico.

21. FILAGO L.

1. **Filago californica** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 405. 1841.
Oglifa californica Rydb. Fl. Rocky Mount. 914. 1917.
Covillea belt. Southwestern Utah to southern California and Arizona.

22. ANTENNARIA Gaertn. PUSSYTOES

Plants not surculose-proliferous, the stolons (if present) erect or essentially so.
Heads solitary, the pistillate 1 to 2 cm. high; plants 5 cm. high or less.
Leaves spatulate, 3 cm. long or less, arachnoid-tomentose.
1. A. dimorpha.
Heads several or numerous, the pistillate 10 mm. high or less; plants usually much more than 5 cm. high.
Leaves narrowly linear or linear-filiform, 3 mm. wide or less; stems low, 15 cm. high or less, equally leafy throughout; involucres greenish black——**2. A. stenophylla.**
Leaves lanceolate to spatulate, 2 to 15 mm. wide; involucres white, greenish, brownish, or rosy, sometimes deep brown at base.
Plants taller, usually 25 cm. or more; leaves 3.5 to 12 cm. long; involucres 3 mm. thick or more, usually campanulate, the tips of the phyllaries very rarely rosy.
Pistillate heads 5 to 7 mm. high, their involucres nearly glabrous, with pale greenish or brownish base——**3. A. argentea.**
Pistillate heads 6 to 8 mm. high, their involucres tomentose to middle, with usually deep brown base——**4. A. anaphaloides.**
Plants low, 15 cm. high or less; leaves spatulate or oblanceolate, 5 cm. long and 6 mm. wide, or smaller; involucre narrowly turbinate or cylindric-turbinate, 2 to 3 mm. thick.
Heads in close corymbs; involucre very woolly, the phyllaries with conspicuous rosy tips (rarely white)——**5. A. geyeri.**
Heads loosely panicled; involucre nearly glabrous, the phyllaries brownish, whitish, or rarely rosy-tinged——**6. A. microcephala.**
Plants densely surculose-proliferous; stolons usually ascending at apex.
Plants acaulescent. Heads sessile among the tufts of spatulate-obovate leaves, these 10 mm. long or less——**7. A. rosulata.**
Plants leafy-stemmed.
Basal leaves soon becoming bright green and glabrate above, permanently white-woolly beneath——**8. A. marginata.**
Basal leaves permanently whitish-woolly on both sides.
Pistillate heads large, 8 to 12 mm. high. Basal leaves spatulate-obovate.
9. A. aprica.
Pistillate heads smaller, 5 to 8 mm. high.
Phyllaries blackish green or deep brownish green, at least at base, their tips sometimes whitish but never rosy.
Basal leaves spatulate-oblanceolate, about 3 cm. long, loosely arachnoid-tomentose——**10. A. corymbosa.**
Basal leaves spatulate to obovate, mostly 1 to 1.5 cm. long or less, densely tomentose.
Phyllaries of the pistillate heads dark blackish green throughout.
11. A. media.
Phyllaries of the pistillate heads with brownish or whitish tips.
12. A. umbrinella.
Phyllaries with pale green or slightly brownish base and white or rosy tips.
Phyllaries with deep rosy tips——**13. A. rosea.**
Phyllaries with white or whitish tips——**14. A. microphylla.**

1. Antennaria dimorpha (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 431. 1843.
Gnaphalium dimorphum Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 405. 1841.
Antennaria dimorpha nuttallii D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 186. 1871.
Antennaria dimorpha macrocephala D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 186. 1871.
Antennaria macrocephala Rydb. Fl. Rocky Mount. 921. 1917.
Artemisia, pinyon, and yellow pine belts. Nebraska to British Columbia and California.

2. Antennaria stenophylla A. Gray, Proc. Amer. Acad. **17**: 213. 1882.
Antennaria alpina stenophylla A. Gray in Wilkes, U. S. Expl. Exped. **17**: 366. 1874.
Antennaria carpathica D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 185. 1871. Not *A. carpathica* R. Br. 1818.
Artemisia and yellow pine belts. Washington to Nevada.

3. Antennaria argentea Benth. Pl. Hartw. 319. 1849.
Artemisia and yellow pine belts. California and western Nevada.

4. Antennaria anaphaloides Rydb. Mem. N. Y. Bot. Gard. **1**: 409. 1900.
Antennaria carpathica pulcherrima D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 185. 1871. Not *A. pulcherrima* Greene, 1897.
Yellow pine, aspen, spruce, and subalpine belts. Montana to British Columbia, Nevada, and Utah.

5. Antennaria geyeri A. Gray, Mem. Amer. Acad. n. ser. **4**: 107. 1849.
Yellow pine belt. Washington to California and Nevada.

6. Antennaria microcephala A. Gray, Proc. Amer. Acad. **10**: 74. 1874.
Artemisia and yellow pine belts. California and Nevada.

7. Antennaria rosulata Rydb. Bull. Torrey Club **24**: 300. 1897.
Yellow pine, aspen, and spruce belts. Colorado, Utah, and Arizona.

8. Antennaria marginata Greene, Pittonia **3**: 290. 1898.
Yellow pine, aspen, and spruce belts. Colorado, Utah, and Arizona.

9. Antennaria aprica Greene, Pittonia **3**: 282. 1898.
Antennaria obtusata Greene, Repert. Nov. Sp. Fedde **5**: 241. 1908.
Artemisia belt, upward to the subalpine belt. Manitoba to New Mexico, Nevada, and British Columbia.

10. Antennaria corymbosa E. Nels. Bot. Gaz. **27**: 212. 1899.
Antennaria hygrophila Greene, Leaflets **2**: 144. 1911.
Yellow pine, aspen, and spruce belts. Montana to Oregon and Nevada.

11. Antennaria media Greene, Pittonia **3**: 286. 1898.
Antennaria austromontana E. Nels. Proc. U. S. Nat. Mus. **23**: 703. 1901.
Alpine belts. Alberta and British Columbia, southward to Colorado and California.

12. Antennaria umbrinella Rydb. Bull. Torrey Club **24**: 302. 1897.
Antennaria alpina D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 185. 1871. Not *A. alpina* Gaertn. 1791.
Antennaria dioica D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 185. 1871, in part. Not *A. dioica* Gaertn. 1791.
Antennaria confinis Greene, Pittonia **4**: 40. 1899.
Spruce and alpine belts. Montana to British Columbia, southward to Arizona.

13. **Antennaria rosea** Greene, Pittonia **3**: 281. 1898.

Antennaria dioica rosea D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 186. 1871, nomen nudum.

Antennaria parvifolia rosea Greene, Pittonia **3**: 175. 1897.

Antennaria imbricata E. Nels. Bot. Gaz. **27**: 211. 1899.

Yellow pine, aspen, spruce, and subalpine belts. Alaska to California, eastward to Colorado.

14. **Antennaria microphylla** Rydb. Bull. Torrey Club **24**: 303. 1897.

Antennaria arida E. Nels. Bot. Gaz. **27**: 210. 1899.

Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to Alaska, southward to Nevada and New Mexico.

23. ANAPHALIS DC. Pearl everlasting

1. **Anaphalis margaritacea subalpina** A. Gray, Syn. Fl. 1^2: 233. 1884.

Antennaria margaritacea D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 185. 1871. **Not** *Anaphalis margaritacea* A. Gray, 1884.

Anaphalis subalpina Rydb. Mem. N. Y. Bot. Gard. **1**: 415. 1900.

Yellow pine, aspen, spruce, and subalpine belts. South Dakota to British Columbia, southward to Nevada and Utah.

24. GNAPHALIUM L. Cudweed

Heads very small, leafy-bracted; involucre scarcely graduate, greenish or deep brownish; plants low, usually 15 cm. high or less.
- Leaves essentially linear (or the lowest slightly spatulate); heads spicately arranged ---- **1. G. grayi.**
- Leaves linear-spatulate to oblanceolate; heads corymbosely clustered at tips of stems and branches.
  - Leaves linear-spatulate; plant appressed-tomentose; phyllaries brownish throughout ---- **2. G. uliginosum.**
  - Leaves spatulate or oblanceolate; plant floccose-tomentose; phyllaries with whitish tips ---- **3. G. palustre.**

Heads medium, not leafy-bracted; involucre strongly graduate, white or yellowish; plants normally 30 cm. high or more.
- Leaves green and glandular on the upper surface ---- **4. G. macounii.**
- Leaves whitish-woolly on both sides.
  - Leaves not at all decurrent. Phyllaries pearly white, at least the inner abruptly pointed ---- **5. G. wrightii.**
  - Leaves decurrent.
    - Stem usually branched above; heads in rather open corymbose panicles; phyllaries pearly white, at least the inner abruptly pointed. **6. G. microcephalum.**
    - Stem usually simple; heads in dense terminal clusters; phyllaries straw-colored or yellowish, very obtuse ---- **7. G. chilense.**

1. **Gnaphalium grayi** Nels. & Macbr. Bot. Gaz. **61**: 46. 1916.

Gnaphalium strictum A. Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 110. 1857. Not *G. strictum* Lam. 1788.

Yellow pine, aspen, and spruce belts. Wyoming to New Mexico and Arizona.

2. **Gnaphalium uliginosum** L. Sp. Pl. 856. 1753.

On plains, upward to the spruce belt. Newfoundland to Utah and Oregon: also in Europe.

3. **Gnaphalium palustre** Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 403. 1841.

On plains, upward to the yellow pine belt. Alberta and British Columbia, southward to New Mexico and Nevada.

4. **Gnaphalium macounii** Greene, Ottawa Nat. **15**: 278. 1902.

Gnaphalium decurrens Ives, Amer. Journ. Sci. **1**: 381. *pl. 1.* 1819. Not *G. decurrens* L. 1759.

Gnaphalium ivesii Nels. & Macbr. Bot. Gaz. **61**: 46. 1916.

On plains, upward to the yellow pine belt. Nova Scotia to Utah and Arizona.

5. **Gnaphalium wrightii** A. Gray, Proc. Amer. Acad. **17**: 214. 1882.

Artemisia, pinyon, and yellow pine belts. Colorado and New Mexico, westward to California.

6. **Gnaphalium microcephalum** Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 404. 1841.

Artemisia, pinyon, and yellow pine belts. Oregon, California, and western Nevada.

7. **Gnaphalium chilense** Spreng. Syst. Veg. **3**: 480. 1826.

Gnaphalium sprengelii Hook. & Arn. Bot. Beechey Voy. 150. 1833.

Gnaphalium luteo-album sprengelii D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 184. 1871.

Gnaphalium sulphurescens Rydb. Mem. N. Y. Bot. Gard. **1**: 415. 1900.

Gnaphalium proximum Greene, Ottawa Nat. **15**: 279. 1902.

Covillea, artemisia, pinyon, and yellow pine belts. Washington to Texas and California.

25. IVA L.

Leaves elliptic to obovate, entire, subcoriaceous; heads solitary in the upper axils, nodding, forming long leafy racemes; perennial, suffrutescent at base ..... **1. I. axillaris.**

Leaves lobed or toothed; heads not in long leafy racemes; annuals.

Plant low, up to 15 cm. high; leaves very small, pinnately 3 to 7-lobed, the divisions often again lobed; heads extra-axillary or crowded on short axillary branches; achenes crustaceous-papillate. **2. I. nevadensis.**

Plant tall, 1 to 2 meters high; leaves large, ovate, toothed; heads very numerous, in terminal leafy panicles; achenes smooth. **3. I. xanthiifolia.**

1. **Iva axillaris** Pursh, Fl. Amer. Sept. 743. 1814.

Artemisia, pinyon, and yellow pine belts. Manitoba to British Columbia, southward to New Mexico and California.

2. **Iva nevadensis** Jones, Amer. Nat. **17**: 973. 1883.

Chorisiva nevadensis Rydb. N. Amer. Fl. **33**: 10. 1922.

Artemisia belt. Nevada.

3. **Iva xanthiifolia** Nutt. Gen. Pl. **2**: 185. 1818.

Cyclachaena xanthifolia Fresen. "Ind. Sem. Hort. Frankf. 4. 1836."

Iva paniculata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 347. 1840.

Artemisia, pinyon, and yellow pine belts. Saskatchewan to Nebraska and New Mexico, westward to Washington.

26. OXYTENIA Nutt.

1. Oxytenia acerosa Nutt. Journ. Acad. Phila. II. 1: 172. 1847.

Covillea and artemisia belts. Southwestern Colorado and Arizona to southeastern California.

27. DICORIA Torr. & Gray

Upper leaves roundish or broadly ovate.
- Achenes 4 mm. long; pales subtending the achenes becoming 5 to 7 mm. long ..... 1. D. canescens.
- Achenes 6 mm. long; pales subtending the achenes becoming papery-inflated, 10 to 13 mm. long ..... 2. D. clarkae.

Upper leaves spatulate to lanceolate or linear.
- Pale subtending the solitary achene scarcely enlarged in fruit, 5 to 6 mm. long ..... 3. D. brandegei.
- Pales subtending the usually 2 achenes papery-inflated in fruit, 8 to 15 mm. long.
  - Pales subtending the inner achenes about 8 mm. long ..... 4. D. paniculata.
  - Pales subtending the inner achenes 10 to 15 mm. long ..... 5. D. wetherillii.

1. Dicoria canescens A. Gray in Torr. U. S. & Mex. Bound. Bot. 87. 1859.

Covillea belt. Southwestern Utah and Arizona to California.

2. Dicoria clarkae Kennedy, Muhlenbergia **4**: 2. 1908.

Covillea belt. Southern Nevada and California.

3. Dicoria brandegei A. Gray, Proc. Amer. Acad. **11**: 76. 1876.

Artemisia belt. Southern Colorado and northern New Mexico, westward to California.

4. Dicoria paniculata Eastw. Proc. Calif. Acad. Sci. II. **6**: 298. *pl. 45*. 1896.

Artemisia belt. Southeastern Utah and northern New Mexico.

5. Dicoria wetherillii Eastw. Proc. Calif. Acad. Sci. II. **6**: 299. 1896.

Covillea belt. Southern Utah.

28. HYMENOCLEA Torr. & Gray

Wings of the pistillate involucre soon wide-spreading, the lower 6 to 8 mm. wide ..... 1. H. salsola.
Wings of the pistillate involucre erect or only at length spreading, the lower 3 to 5 mm. wide ..... 2. H. fasciculata.

1. Hymenoclea salsola Torr. & Gray, Mem. Amer. Acad. n. ser. **4**: 79. 1849.

Covillea belt. Southwestern Utah to Arizona and California.

2. Hymenoclea fasciculata A. Nels. Bot. Gaz. **37**: 270. 1904.

Hymenoclea monogyra D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 166. 1871. Not *H. monogyra* Torr. & Gray, 1849.

Hymenoclea fasciculata patula A. Nels. Bot. Gaz. **47**: 431. 1909.

Covillea and lower artemisia belts. Southwestern Utah and Arizona, westward to California.

29. AMBROSIA L. Ragweed

Plants perennial, with running rootstocks; leaves pinnatifid, the lobes usually again toothed; fruit unarmed or with 1 to 6 usually blunt tubercles.
- Hairs of stem appressed or ascending ..... 1. A. psilostachya.
- Hairs of stem wide-spreading ..... 1a. A. psilostachya californica.

Plant annual; leaves mostly bipinnatifid; fruit with 4 to 6 acute teeth. ..... 2. A. elatior.

1. Ambrosia psilostachya DC. Prodr. **5:** 526. 1836.
Ambrosia coronopifolia Torr. & Gray, Fl. N. Amer. **2:** 291. 1842.
Artemisia, pinyon, and yellow pine belts. Illinois to Saskatchewan, Utah, and California.

1a. Ambrosia psilostachya californica (Rydb.) Blake.
Ambrosia californica Rydb. N. Amer. Fl. **33:** 20. 1922.
Colorado to California, Nevada (according to Rydberg), and New Mexico.

2. Ambrosia elatior L. Sp. Pl. 987. 1753.
Ambrosia artemisiifolia L. Sp. Pl. 988. 1753.
Ambrosia media Rydb. Bull. Torrey Club **37:** 127. 1910.
Artemisia, pinyon, and yellow pine belts. Nova Scotia to British Columbia, southward to Virginia, Colorado, and Nevada.

30. FRANSERIA Cav. Bur-sage

Plants annual. Leaves varying from 5-cleft to tripinnatifid; fruit 5 to 8 mm. long, armed with flattish lance-subulate spines_____1. **F. acanthicarpa.**
Plants shrubs.
Fruit glandular, its spines not villous; leaves once to thrice pinnately parted into mostly roundish lobes, silvery-canescent both sides__2. **F. dumosa.**
Fruit densely villous; leaves lanceolate to deltoid, from merely dentate to laciniate-pinnatifid, greenish above, canescent beneath.
3. **F. eriocentra.**

1. Franseria acanthicarpa (Hook.) Coville, Contr. U. S. Nat. Herb. **4:** 129. 1893.
Ambrosia acanthicarpa Hook. Fl. Bor. Amer. **1:** 309. 1834.
Franseria montana Nutt. Trans. Amer. Phil. Soc. n. ser. **7:** 345. 1840.
Franseria hookeriana Nutt. Trans. Amer. Phil. Soc. n. ser. **7:** 345. 1840.
Gaertneria acanthicarpa Britton, Mem. Torrey Club **5:** 332. 1894.
Covillea, artemisia, pinyon, and yellow pine belts. Saskatchewan to Texas, Nevada, and California.

2. Franseria dumosa A. Gray, in Frém. Rep. Expl. Rocky Mount. 316. 1845.
Franseria albicaulis Torr. Pl. Fremont. 16. 1853.
Covillea belt. Southwestern Utah and Nevada to California and Mexico.

3. Franseria eriocentra A. Gray, Proc. Amer. Acad. **7:** 355. 1868.
Covillea belt. Southwestern Utah, Nevada, California, and Arizona.

31. XANTHIUM L. Cocklebur

Leaves ovate or lanceolate, canescent-pubescent beneath, with trifurcate yellow spines in the axils; fruit about 1 cm. long, armed with slender hooked spines.
1. **X. spinosum.**
Leaves reniform-orbicular to deltoid-ovate, green both sides, without spines in the axils; fruit about 1.5 to 2 cm. long. densely covered with stout hooked prickles.
Body of fruit usually subcylindric, the prickles glandular and sparsely pubescent below_____2. **X. pensylvanicum.**
Body of fruit usually broadly oblong, the prickles densely hispid to middle.
3. **X. italicum.**

1. Xanthium spinosum L. Sp. Pl. 987. 1753.
Waste places; Verdi, Nevada. A widely distributed weed in most of the world.

2. **Xanthium pensylvanicum** Wallr. "Beitr. Bot. 1: 236. 1842."
Xanthium strumarium echinatum D. C. Eaton in King, Geol. Expl. 40th Par. 5: 166. 1871.
Waste places. A weed throughout the United States.

3. **Xanthium italicum** Mor. "Brugnatelli Giorn. Fis. Dec. II. 5: 326. 1822;" Reichenb. Icon. Bot. 4: 22. *pl. 323.* 1826.
Xanthium commune Britton, Man. 912. 1901.
Waste places, Utah. A widespread weed in North American and the Old World.

32. ZINNIA L. ZINNIA

1. **Zinnia grandiflora** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 348. 1840.
Covillea and artemisia belts. Kansas and Texas to Nevada.

33. RUDBECKIA L. CONEFLOWER

1. **Rudbeckia occidentalis** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 355. 1840.
NIGGERHEADS.
Yellow pine, aspen, and spruce belts. Wyoming and Utah, westward to Washington and California.

Rudbeckia laciniata L. (*R. ampla* A. Nels.) may occur, but has not yet been collected. It may be distinguished by its large yellow rays and 3 to 5-cleft or pinnatifid leaves.

Ratibida columnifera (Nutt.) Woot. & Standl. may occur, but no specimens have been seen from Utah and Nevada. It has pinnately divided leaves, a columnar brownish disk, yellow rays, and distinctly compressed, margined achenes with a pappus of very short squamellae and a single awn.

34. BALSAMORHIZA Hook. BALSAMROOT

Leaves triangular, entire, cordate at base, canescent-tomentose, like the whole plant ..... 1. B. sagittata.
Leaves pinnately lobed, not cordate, green or rarely canescent.
Plant softly and canescently pilose-tomentose; phyllaries ovate. ..... 2. B. incana.
Plant green, usually hispid.
Hairs nearly all appressed; leaves not scabrous, densely appressed-pubescent above ..... 3. B. hookeri.
Hairs spreading; leaves harsh-pubescent, not densely appressed-pubescent above.
Heads 4 to 6 cm. wide; leaf segments 1.5 to 3 cm. long, usually toothed. ..... 4. B. hirsuta.
Heads 8 to 9 cm. wide; leaf segments 4.5 to 11 cm. long, entire or lobate-toothed ..... 5. B. macrophylla.

1. **Balsamorhiza sagittata** (Pursh) Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 350. 1840.
Buphthalmum sagittatum Pursh, Fl. Amer. Sept. 564. 1814.
Yellow pine, aspen, and spruce belts. Saskatchewan to British Columbia, southward to Colorado and California.

2. **Balsamorhiza incana** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 350. 1840.
Artemisia, pinyon, and yellow pine belts. Montana to Washington, southward to Wyoming, Nevada, and California.

3. **Balsamorhiza hookeri** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 349. 1840.
Heliopsis ? balsamorhiza Hook. Fl. Bor. Amer. 2: 310. 1834.
Balsamorhiza balsamorhiza Heller, Cat. N. Amer. Pl. 7. 1898.
Artemisia and pinyon belts. Washington to Nevada and California.

4. **Balsamorhiza hirsuta** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 349. 1840.
Yellow pine belt. British Columbia to Utah and California.

5. **Balsamorhiza macrophylla** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 350. 1840.
Yellow pine belt. Wyoming, Utah, and Nevada.

35. WYETHIA Nutt.

Stem bright white, like the leaves tuberculate-hispidulous; leaves linear, up to 15 cm. long, 1 to 1.8 cm. wide; involucre strongly graduated, the phyllaries with narrow subulate wide-spreading tips_____1. W. scabra.
Stems not bright white; leaves elliptic-oblong or oval, much wider; involucre subequal or with the outer phyllaries longer, without subulate tips.
Plant canescent-tomentose_____2. W. mollis.
Plants green, glabrous or merely hispid-pilose.
Plant glabrous and smooth throughout_____3. W. amplexicaulis.
Plant hispidulous or hispid-pilose_____4. W. arizonica.

1. **Wyethia scabra** Hook. Lond. Journ. Bot. 6: 245. 1847.
Artemisia, pinyon, and yellow pine belts. Wyoming, Utah, and New Mexico.

2. **Wyethia mollis** A. Gray, Proc. Amer. Acad. 6: 544. 1865.
Artemisia, pinyon, and yellow pine belts. Oregon, California, and Nevada.

3. **Wyethia amplexicaulis** Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 352. 1840.
Espeletia amplexicaulis Nutt. Journ. Acad. Phila. 7: 38. 1834.
Yellow pine, aspen, and spruce belts. Montana to Utah, Nevada, and Oregon.

4. **Wyethia arizonica** A. Gray, Proc. Amer. Acad. 8: 655. 1873.
Yellow pine belt. Colorado, Utah, New Mexico, and Arizona.

36. VIGUIERA H. B. K.

Plant a shrub; leaves deltoid, strongly toothed, reticulate; pappus present.
1. V. deltoidea parishii.
Plants herbs; leaves lance-ovate to linear, entire or merely serrate, not reticulate; pappus none.
Plants perennial.
Leaves lanceolate or ovate-lanceolate, rarely linear-lanceolate, 6 to 30 mm. wide_____2. V. multiflora.
Leaves narrowly linear-lanceolate, strongly revolute, 2 to 5 mm. wide.
2a. V. multiflora nevadensis.
Plants annual.
Phyllaries green, hispid-ciliate, at apex hispidulous, otherwise subglabrous; leaves hispid-pilose-ciliate_____3. V. ciliata.
Phyllaries subcanescently strigose and strigillose; leaves tuberculate-strigillose, not conspicuously ciliate_____4. V. annua.

1. **Viguiera deltoidea parishii** (Greene) Vasey & Rose, Contr. U. S. Nat. Herb. 1: 72. 1890.
Viguiera parishii Greene, Bull. Torrey Club 9: 15. 1882.
Covillea belt. Southern Nevada to California and Mexico.

Viguiera reticulata S. Wats., distinguished by its entire leaves which are finely and densely reticulate beneath, should occur in Nevada. It is so far known only from Inyo County, California.

2. Viguiera multiflora (Nutt.) Blake, Contr. Gray Herb. n. ser. **54:** 108. 1918.
Heliomeris multiflora Nutt. Journ. Acad. Phila. II. **1:** 171. 1848.
Gymnolomia multiflora Benth. & Hook.; Rothr. in Wheeler, Rep. U. S. Surv. 100th Merid. **6:** 160. 1878.
Yellow pine, aspen, and spruce belts. Montana to New Mexico, westward to Idaho and California.

2a. Viguiera multiflora nevadensis (A. Nels.) Blake, Contr. Gray Herb. n. ser. **54:** 110. 1918.
Gymnolomia nevadensis A. Nels. Bot. Gaz. **37:** 271. 1904.
Gymnolomia linearis Rydb. Bull. Torrey Club **37:** 327. 1910.
Covillea belt. Southwestern Utah, Nevada, and California.

3. Viguiera ciliata (Robins. & Greenm.) Blake, Contr. Gray Herb. n. ser. **54:** 113. 1918.
Gymnolomia hispida ciliata Robins. & Greenm. Proc. Bost. Soc. Nat. Hist. **29:** 93. 1899.
Gymnolomia ciliata Rydb. Bull. Torrey Club **37:** 328. 1910.
Covillea and artemisia belts. Utah to Mexico and southern California.

4. Viguiera annua (Jones) Blake, Contr. Gray Herb. n. ser. **54:** 112. 1918.
Gymnolomia multiflora annua Jones, Proc. Calif. Acad. II. **5:** 698. 1895.
Gymnolomia annua Robins. & Greenm. Proc. Bost. Soc. Nat. Hist. **29:** 93. 1899.
Covillea and artemisia belts. Southwestern Utah to Texas and Mexico.

37. HELIANTHUS L. SUNFLOWER

Plants annual.
  Phyllaries strongly ciliate, mostly broadly obovate.
    Leaves, at least the lower, broadly ovate or deltoid-ovate, often cordate; disk 2 to 5 cm. wide or more; plant usually tall and stout. **1. H. annuus.**
    Leaves lanceolate to ovate-lanceolate, cuneate at base; disk less than 2 cm. wide; plant slender, usually about 30 cm. high ..... **2. H. aridus.**
  Phyllaries obscurely or not at all ciliate, usually lanceolate .. **3. H. petiolaris.**
Plants perennial.
  Stem scabrous-pubescent throughout, not glaucous ..... **4. H. cusickii.**
  Stem glabrous, more or less glaucous.
    Leaves, at least the lower, coarsely toothed, usually pale beneath. **5. H. grosseserratus.**
    Leaves entire or sparsely denticulate, usually green beneath. **6. H. nuttallii.**

1. Helianthus annuus L. Sp. Pl. 904. 1753.
Helianthus lenticularis Dougl. in Lindl. Bot. Reg. **14:** *pl. 1265.* 1829.
Artemisia, pinyon, and yellow pine belts. Utah and Nevada. Throughout the United States as a weed, native in the west. This is the State flower of Kansas.

2. Helianthus aridus Rydb. Bull. Torrey Club **32:** 127. 1905.
Helianthus exilis D. C. Eaton in King, Geol. Expl. 40th Par. **5:** 168. 1871. Not *H. exilis* A. Gray, 1865.
Artemisia, pinyon, and yellow pine belts. Saskatchewan to Arizona and Nevada.

3. Helianthus petiolaris Nutt. Journ. Acad. Phila. **2**: 115. 1821.
Artemisia belt, upward to the spruce belt. Saskatchewan to Missouri, westward to California and British Columbia.

4. Helianthus cusickii A. Gray, Proc. Amer. Acad. **21**: 413. 1886.
Artemisia belt. British Columbia to California and Nevada.

5. Helianthus grosseserratus Martens, "Sel. Stirp. Hort. Lovan. 1839;" Linnaea **14**: Litt. 133. 1840.
Artemisia belt; Utah (?). New York to Texas, Utah, and Saskatchewan.

6. Helianthus nuttallii Torr. & Gray, Fl. N. Amer. **2**: 324. 1842.
Helianthus giganteus utahensis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 169. 1871.
Helianthus fascicularis Greene, Pl. Baker. **3**: 28. 1901.
Helianthus utahensis A. Nels. Bull. Torrey Club **29**: 405. 1902.
Artemisia belt. Saskatchewan to New Mexico and Nevada.

38. ENCELIA Adans.

Heads numerous, panicled; branches of inflorescence glabrous; plant white-farinose; leaves chiefly basal----------1. E. farinosa.
Heads solitary at tips of long pubescent peduncles; plant scabrous-pubescent or softly canescent-pubescent, not farinose; stems leafy.
Leaves not white-pubescent, sometimes cinereous-scabrous.
Leaves not cinereous-scabrous.
Leaves scabrous with scattered tuberculate-based hairs; plant not glandular----------2. E. frutescens.
Leaves glandular and scabrous with tuberculate-based hairs; plant glandular----------2a. E. frutescens resinosa.
Leaves cinereous-scabrous with a fine glandular pubescence intermixed with stouter tuberculate-based hairs----2b. E. frutescens virginensis.
Leaves whitened with a rather soft, fine pubescence--2c. E. frutescens actoni.

1. Encelia farinosa A. Gray; Torr. in Emory, Mil. Reconn. 143. 1848.
Covillea belt. Southern Utah to California, southward to Mexico.

2. Encelia frutescens A. Gray, Proc. Amer. Acad. **8**: 657. 1873.
Simsia frutescens A. Gray in Torr. U. S. & Mex. Bound. Bot. 89. 1859.
Covillea belt; Needles, California. California and Arizona.

2a. Encelia frutescens resinosa Jones; Blake, Proc. Amer. Acad. **49**: 363. 1913.
Artemisia and pinyon belts. Utah and Arizona.

2b. Encelia frutescens virginensis (A. Nels.) H. M. Hall, Univ. Calif. Pub. Bot. **3**: 135. 1907.
Encelia virginensis A. Nels. Bot. Gaz. **37**: 272. 1904.
Covillea and artemisia belts. Utah and Nevada.

2c. Encelia frutescens actoni (Elmer) H. M. Hall, Univ. Calif. Publ. Bot. **3**: 135. 1907.
Encelia actoni Elmer, Bot. Gaz. **39**: 47. 1905.
Covillea and artemisia belts. Nevada, Arizona, and California.

39. GERAEA Torr. & Gray

1. Geraea canescens Torr. & Gray, Amer. Journ. Sci. II. **3**: 275. 1847.
Encelia eriocephala A. Gray, Proc. Amer. Acad. **8**: 657. 1873.
Covillea belt. Southern Utah to California, southward to Mexico.

40. ENCELIOPSIS (A. Gray) A. Nels.

Heads discoid; plant hispid-canescent ..... 1. E. nutans.
Heads radiate; plants densely white-pubescent.
  Pubescence dull, not silvery; leaves mostly obtuse or rounded. 2. E. nudicaulis.
  Pubescence silvery-velutinous; leaves acute, rhombic-ovate .. 3. E. argophylla.

1. **Enceliopsis nutans** (Eastw.) A. Nels. Bot. Gaz. **47**: 433. 1909.
   Encelia nutans Eastw. Zoe **2**: 230. 1891.
   Verbesina scaposa Jones, Zoe **2**: 248. 1891.
   Artemisia belt. Colorado and Utah.

2. **Enceliopsis nudicaulis** (A. Gray) A. Nels. Bot. Gaz. **47**: 433. 1909.
   Encelia nudicaulis A. Gray, Proc. Amer. Acad. **8**: 656. 1873.
   Enceliopsis tuta A. Nels. Bot. Gaz. **47**: 433. 1909.
   Artemisia belt. Idaho to Arizona and Nevada.

3. **Enceliopsis argophylla** (D. C. Eaton) A. Nels. Bot. Gaz. **47**: 433. 1909.
   Tithonia argophylla D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 423. 1871.
   Encelia argophylla A. Gray, Proc. Amer. Acad. **8**: 657. 1873.
   Covillea belt. Southern Utah and Nevada.

Enceliopsis grandiflora (Jones) A. Nels., of the Panamint Valley of California, will probably be found in Nevada. It is close to *E. argophylla*, but has larger rays (3.5 to 4.2 cm. long) and glabrate or puberulent achenes. In *E. argophylla* the rays are about 2 cm. long, and the achenes are silky-villous.

41. HELIANTHELLA Torr. & Gray

Disk purple, about 1 cm. wide; phyllaries indurate below, only the tips subherbaceous ..... 1. H. microcephala.
Disk yellow, 1.5 to 3 cm. wide; phyllaries herbaceous or foliaceous.
  Pales soft and scarious; leaves thin, scarcely reticulate, the lowest ovate, much larger than the upper ..... 2. H. quinquenervis.
  Pales firm; leaves thick, reticulate, the lowest little larger than the others, all elliptic to lanceolate ..... 3. H. uniflora.

1. **Helianthella microcephala** A. Gray, Proc. Amer. Acad. **19**: 10. 1883.
   Encelia microcephala A. Gray, Proc. Amer. Acad. **8**: 657. 1873.
   Artemisia belt. Colorado, Utah, and New Mexico.

2. **Helianthella quinquenervis** (Hook.) A. Gray, Proc. Amer. Acad. **19**: 10. 1883.
   Helianthus quinquenervis Hook. Lond. Journ. Bot. **6**: 247. 1847.
   Helianthella uniflora D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 170. 1871. Not *H. uniflora* Torr. & Gray, 1842.
   Yellow pine, aspen, and spruce belts. South Dakota to Idaho, southward to New Mexico and Nevada.

3. **Helianthella uniflora** (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 334. 1842.
   Helianthus uniflorus Nutt. Journ. Acad. Phila. **7**: 37. 1834.
   Helianthella multicaulis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 170. 1871.
   Yellow pine, aspen, and spruce belts. Montana to New Mexico and Nevada.

42. THELESPERMA Less.

Rays present; pappus obsolete; leaves chiefly basal; inner phyllaries broadly scarious-margined ..... 1. T. subnudum.
Rays absent; pappus of 2 retrorsely hispid awns; stems leafy; inner phyllaries very narrowly scarious-margined ..... 2. T. gracile.

1. **Thelesperma subnudum** A. Gray, Proc. Amer. Acad. **10**: 72. 1874.
Artemisia and pinyon belts. Colorado, Utah, and Arizona.

2. **Thelesperma gracile** (Torr.) A. Gray, Journ. Bot. Kew Misc. **1**: 252. 1849.
Bidens gracilis Torr. Ann. Lyc. N. Y. **2**: 215. 1828.
Covillea and artemisia belts. Nebraska to Wyoming, Utah, and Arizona.

43. BIDENS L.

Leaves merely toothed; heads nodding----------**1. B. cernua.**
Leaves pinnately 3 to 5-parted; heads erect.
Outer involucre of 5 to 8 leafy bracts; achenes 2 to 3.3 mm. wide.
2. B. frondosa.
Outer involucre of 10 to 16 leafy bracts; achenes 3.3 to 4 mm. wide.
3. B. vulgata.

1. **Bidens cernua** L. Sp. Pl. 832. 1753.
Bidens glaucescens Greene, Pittonia **4**: 258. 1901.
Artemisia, pinyon, and yellow pine belts. Labrador to British Columbia, California, and North Carolina.

2. **Bidens frondosa** L. Sp. Pl. 832. 1753.
Artemisia belt. New Brunswick to British Columbia, southward to Utah and Florida.

3. **Bidens vulgata** Greene, Pittonia **4**: 72. 1899.
Artemisia belt. Ontario to British Columbia, southward to North Carolina and California.

44. BEBBIA Greene

1. **Bebbia juncea aspera** Greene, Bull. Calif. Acad. **1**: 180. 1885.
Bebbia aspera A. Nels. Bot. Gaz. **37**: 273. 1904.
Covillea belt. California, southern Nevada, and Arizona.

45. BLEPHARIPAPPUS Hook.

1. **Blepharipappus scaber** Hook. Fl. Bor. Amer. **1**: 316. 1834.
Ptilonella scabra Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 386. 1841.
Artemisia, pinyon, and yellow pine belts. Washington to California, Nevada, and Idaho.

46. MADIA Mol. TARWEED

Rays conspicuous, 12 to 15, 1 cm. long or more; receptacle hirsute-fimbrillate.
1. M. corymbosa.
Rays short and inconspicuous, 12 or fewer, 6 mm. long or less; receptacle glabrous.
Disk flower solitary, its corolla glabrous----------**2. M. exigua.**
Disk flowers several, their corollas pubescent.
Heads glomerate; rays 5 or less----------**3. M. glomerata.**
Heads not glomerate; rays 5 to 12.
Heads on short branches, racemosely arranged----------**4. M. racemosa.**
Heads on longer branches, corymbose or panicled----**5. M. dissitiflora.**

1. **Madia corymbosa** (DC.) Lindl.; Baxt. in Loud. Hort. Brit. Suppl. 584. 1850.
Madaria corymbosa DC. Prodr. **5**: 692. 1836.
Yellow pine belt. Oregon, California, and Nevada.

2. **Madia exigua** (J. E. Smith) Greene, Erythea **1**: 90. 1893.
Sclerocarpus exiguus J. E. Smith in Rees's Cycl. **31**: *Sclerocarpus* No. 3. 1819.

Harpaecarpus exiguus A. Gray in Torr. U. S. & Mex. Bound. bot. 101. 1859.
Madia filipes A. Gray, Proc. Amer Acad. **8**: 391. 1872.
Artemisia belt. British Columbia to California and Nevada.

3. **Madia glomerata** Hook. Fl. Bor. Amer. **2**: 24. 1834.
Amida hirsuta Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 390. 1841.
Artemisia belt, upward to the spruce belt. Saskatchewan to Colorado and California.

4. **Madia racemosa** (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 405. 1843.
Madorella racemosa Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 387. 1841.
Artemisia belt. British Columbia to California and Utah.

5. **Madia dissitiflora** (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 405. 1843.
Madorella dissitiflora Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 387. 1841.
Yellow pine belt. British Columbia to California and Utah.

47. HEMIZONELLA A. Gray

1. **Hemizonella minima** A. Gray, Proc. Amer. Acad. **9**: 189. 1874.
Hemizonia minima A. Gray, Proc. Amer. Acad. **6**: 548. 1865.
Harpaecarpus minimus Greene, Fl. Franc. 417. 1897.
Yellow pine belt. British Columbia to California and Nevada.

Hemizonella durandi A. Gray, a doubtfully distinct species, is reported from Nevada by D. C. Eaton, but no specimens have been seen by the writer. It scarcely differs except for its larger size (up to 15 cm. high), more slender-peduncled heads, and short-beaked ray achenes.

48. HEMIZONIA DC.

1. **Hemizonia pungens** (Hook. & Arn.) Torr. & Gray, Fl. N. Amer. **2**: 399. 1843.
Hartmannia ? pungens Hook. & Arn. Bot. Beechey Voy. 357. 1840.
Centromadia pungens Greene, Man. Bot. San Fran. Bay 196. 1894.
Covillea and artemisia belts. California and Nevada.

49. LAGOPHYLLA Nutt.

1. **Lagophylla ramosissima** Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 391. 1841.
Artemisia belt. Washington to California and Nevada.

50. LAYIA Hook. & Arn.

Pappus awns densely villous below the middle, the outer hairs straight, the inner crisped and woolly ..... 1. L. glandulosa.
Pappus awns very sparsely villous at base. the hairs all straight. ..... 2. L. douglasii.

1. **Layia glandulosa** (Hook.) Hook. & Arn. Bot. Beechey Voy. 358. 1840.
Blepharipappus glandulosus Hook. Fl. Bor. Amer. **1**: 316. 1834.
Layia heterotricha D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 177. 1871.
Not *L. heterotricha* Hook. & Arn. 1840.
Covillea, artemisia, pinyon, and yellow pine belts. British Columbia to California and New Mexico.

2. **Layia douglasii** Hook. & Arn. Bot. Beechey Voy. 358. 1840.
Blepharipappus douglasii Greene, Pittonia **2**: 247. 1892.
Artemisia belt; Austin, Nevada (according to Gray). Washington to California and Nevada.

51. PSILOSTROPHE DC.

Stems densely white pannose-tomentose; leaves linear or narrowly linear-spatulate; plant suffrutescent----------1. P. cooperi.
Stems pilose or villous; leaves (at least the basal) narrowly spatulate to obovate; plants herbaceous.
Stems densely villous; lower leaves obovate, 1 to 2.5 cm. wide; ligules 6 to 14 mm. long----------2. P. bakeri.
Stems loosely pilose, glabrescent; lower leaves narrowly spatulate or linear-oblanceolate, 8 mm. wide or less; ligules about 7 mm. long.
3. P. sparsiflora.

1. **Psilostrophe cooperi** (A. Gray) Greene, Pittonia **2**: 176. 1891.
Riddellia cooperi A. Gray, Proc. Amer. Acad. **7**: 358. 1868.
Gravelly places and desert areas of the Covillea belt. Southern California and Nevada, southern Utah, and New Mexico.

2. **Psilostrophe bakeri** Greene, Pl. Baker. **3**: 29. 1901.
Riddellia tagetina pumila Jones, Proc. Calif. Acad. II. **5**: 700. 1895.
Psilostrophe pumila A. Nels. Proc. Biol. Soc. Washington **16**: 22. 1903.
Gravelly slopes and desert areas of the artemisia belt. Western Colorado and eastern Utah.

3. **Psilostrophe sparsiflora** (A. Gray) A. Nels. Proc. Biol. Soc. Washington **16**: 23. 1903.
Riddellia tagetina sparsiflora A. Gray, Syn. Fl. 1^2: 318. 1884.
Psilostrophe tagetina sparsiflora Greene, Pittonia **2**: 176. 1891.
Dry hills and canyons of the artemisia belt. Southern Utah, northern Arizona, and New Mexico.

52. BAILEYA Harv. & Gray

Plants annual. Stems leafy----------1. B. pleniradiata.
Plants biennial or perennial.
Stem leafy for half its length or more----------2. B. perennis.
Stems nearly naked, the leaves chiefly basal, those above the base of stem much reduced----------3. B. multiradiata.

1. **Baileya pleniradiata** Harv. & Gray; A. Gray, Mem. Amer. Acad. n. ser. **4**: 105. 1849.
Baileya multiradiata pleniradiata Coville, Contr. U. S. Nat. Herb. **4**: 133. 1893.
Baileya nervosa Jones, Contr. West. Bot. **8**: 34. 1898.
Plains and dry hillsides of the Covillea and artemisia belts. Southern Utah to southern California, southward to Sonora.

2. **Baileya perennis** (A. Nels.) Rydb. N. Amer. Fl. **34**: 10. 1914.
Baileya pleniradiata perennis A. Nels. Bot. Gaz. **47**: 431. 1909.
Covillea belt. Southern Nevada to Arizona and Chihuahua.

3. **Baileya multiradiata** Harv. & Gray in Emory, Mil. Reconn. 144. *pl. 6.* 1848
Baileya multiradiata nudicaulis A. Gray, Syn. Fl. 1^2: 318. 1884.
Dry canyons, hillsides, and desert areas of the Covillea and artemisia belts. Western Texas to southern Utah, Nevada, and California, southward to Mexico.

53. LAPHAMIA A. Gray

Heads radiate----1. L. stansburii.
Heads discoid.
  Pappus awn wanting.
    Involucre 4 to 5 mm. high; heads 7 to 9 mm. thick; leaves rotund-ovate. 2. L. megacephala.
    Involucre 4 mm. high or less; heads about 5 mm. thick; leaves linear or linear-spatulate----3. L. intricata.
  Pappus awn present.
    Leaves rhombic-spatulate, trifid, or the upper entire----4. L. fastigiata.
    Leaves broadly ovate or orbicular-ovate, sharply dentate----5. L. palmeri.

1. Laphamia stansburii A. Gray, Pl. Wright. 1: 101. 1852.
Monothrix stansburiana Torr. in Stansb. Expl. Great Salt Lake 390. *pl.* 7. 1852.
Monothrix stansburii Rydb. N. Amer. Fl. **34**: 19. 1914.
Crevices of rocks of the artemisia belt; about Great Salt Lake. Northern and central Utah.

2. Laphamia megacephala S. Wats. Amer. Nat. **7**: 301. 1873.
Monothrix megacephala Rydb. N. Amer. Fl. **34**: 20. 1914.
Covillea and artemisia belts. Nevada.

3. Laphamia intricata T. S. Brandeg. Bot. Gaz. **27**: 450. 1899.
Monothrix intricata Rydb. N. Amer. Fl. **34**: 20. 1914.
Among basalt rocks of the Covillea and artemisia belts. Nevada.

4. Laphamia fastigiata T. S. Brandeg. Bot. Gaz. **27**: 451. 1899.
Monothrix fastigiata Rydb. N. Amer. Fl. **34**: 21. 1914.
Sheep Mountain, Nevada.

5. Laphamia palmeri A. Gray, Proc. Amer. Acad. **13**: 372. 1878.
Laphamia palmeri tenella Jones, Proc. Calif. Acad. II. **5**: 703. 1895.
Monothrix palmeri Rydb. N. Amer. Fl. **34**: 21. 1914.
Among rocks of the artemisia and pinyon belts. Arizona and southern Utah.

54. EATONELLA A. Gray

1. Eatonella nivea (D. C. Eaton) A. Gray, Proc. Amer. Acad. **19**: 19. 1883.
Burrielia nivea D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 174. *pl. 18, f. 6–14.* 1871.
Actinolepis nivea A. Gray, Bot. Calif. **1**: 379. 1876.
Canyons and dry hillsides of the artemisia belt. Western Nevada and adjacent California.

55. PERICOME A. Gray

1. Pericome caudata A. Gray, Pl. Wright. **2**: 82. 1853.
Artemisia, pinyon, and yellow pine belts. Western Texas to southern California and northern Mexico.

56. SYNTRICHOPAPPUS A. Gray

1. Syntrichopappus fremontii A. Gray in Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 106. 1857.
Valleys and desert areas of the Covillea and artemisia belts. Southern Utah, Nevada, Arizona, and southern California.

57. HYMENOPAPPUS L'Hér.

Plants leafy-stemmed.
  Corolla throat about twice as long as the teeth.
    Pappus very short, hidden by the hairs of the achene_____1. H. filifolius.
    Pappus not hidden by the hairs of the achene_____2. H. tomentosus.
  Corolla throat three to four times as long as the teeth_____3. H. eriopodus.
Plants scapose or essentially so.
  Corolla throat about twice as long as the lobes_____4. H. cinereus.
  Corolla throat three or four times as long as the lobes_____5. H. lugens.

1. Hymenopappus filifolius Hook. Fl. Bor. Amer. **1**: 317. 1834.

Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Saskatchewan to Kansas and New Mexico, westward to Washington and Nevada.

2. Hymenopappus tomentosus Rydb. Bull. Torrey Club **27**: 633. 1900.

Covillea belt. Southwestern Utah.

3. Hymenopappus eriopodus A. Nels. Bot. Gaz. **37**: 274. 1904.
Hymenopappus niveus Rydb. N. Amer. Fl. **34**: 52. 1914.

Artemisia belt. Utah and Nevada.

4. Hymenopappus cinereus Rydb. Bull. Torrey Club **27**: 634. 1900.

Canyons and hillsides of the artemisia, pinyon, and yellow pine belts. Colorado and Utah.

5. Hymenopappus lugens Greene, Pittonia **4**: 43. 1899.
Hymenopappus tenuifolius D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 173. 1871. Not *H. tenuifolius* Pursh, 1814.
Hymenopappus gloriosus A. Heller, Bull. Torrey Club **26**: 551. 1899.
Hymenopappus scaposus Rydb. Bull. Torrey Club **27**: 634. 1900.
Hymenopappus nanus Rydb. N. Amer. Fl. **34**: 53. 1914.

Artemisia belt. Southwestern Colorado and New Mexico, westward to California.

58. HYMENOTHRIX A. Gray

1. Hymenothrix wrightii A. Gray, Pl. Wright **2**: 97. 1853.
Hymenopappus wrightii H. M. Hall, Univ. Calif. Publ. Bot. **3**: 179. 1907.
Trichymenia wrightii Rydb. N. Amer. Fl. **34**: 56. 1914.

Artemisia, pinyon, and yellow pine belts. New Mexico to southern California, southward to Mexico.

59. PALAFOXIA Lag.

1. Palafoxia linearis (Cav.) Lag. Gen. & Sp. Nov. 26. 1816.
Ageratum lineare Cav. Icon. Pl. **3**: 3. *pl. 205*. 1795.

Desert areas and dry canyons of the Covillea belt. Southern Utah to California, southward to Mexico.

60. ERIOPHYLLUM Lag.

Plant perennial; disk about 1 cm. high_____1. E. watsoni.
Plants dwarf annuals; disk 7 mm. high or less.
  Pappus squamellae partly linear-lanceolate, awn-tipped; rays white or rosy.
    2. E. lanosum.
  Pappus squamellae oval or oblong, not awn-tipped; rays yellow or wanting.
    Rays wanting; heads glomerate; squamellae hyaline, lacerate.
      3. E. pringlei.
    Rays present; heads not glomerate; squamellae opaque, entire.
      4. E. wallacei.

1. Eriophyllum watsoni A. Gray, Proc. Amer. Acad. **19**: 26. 1883.
Bahia leucophylla D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 173. 1871. Not *B. leucophylla* DC. 1836.
Eriophyllum trichocarpum Rydb. N. Amer. Fl. **34**: 89. 1915.
Yellow pine, aspen, and spruce belts. Oregon, Idaho, and Nevada.

2. Eriophyllum lanosum A. Gray, Proc. Amer. Acad. **19**: 25. 1883.
Burrielia lanosa A. Gray in Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 107. 1857.
Actinolepis lanosa A. Gray, Proc. Amer. Acad. **9**: 198. 1874.
Antheropeas lanosum Rydb. N. Amer. Fl. **34**: 98. 1915.
Desert areas, dry hillsides, and canyons of the Covillea belt. Southwestern Utah, Arizona, and Lower California.

3. Eriophyllum pringlei A. Gray, Proc. Amer. Acad. **19**: 25. 1883.
Actinolepis pringlei Greene, Fl. Franc. 441. 1897.
Desert areas, greasewood flats and dry canyons of the Covillea and artemisia belts. Arizona, southern Nevada, and California.

4. Eriophyllum wallacei A. Gray, Proc. Amer. Acad. **19**: 25. 1883.
Bahia wallacei A. Gray in Torr. U. S. Rep. Expl. Miss. Pacif. **4**: 105. 1857.
Actinolepis wallacei A. Gray, Proc. Amer. Acad. **9**: 198. 1874.
Antheropeas wallacei Rydb. N. Amer. Fl. **34**: 98. 1915.
Desert areas and dry hillsides of the Covillea and artemisia belts. Southern Utah to Arizona and southern California.

61. RIGIOPAPPUS A. Gray

1. Rigiopappus leptocladus A. Gray, Proc. Amer. Acad. **6**: 548. 1865.
Canyons and foothills of the artemisia belt. Washington and Idaho to Utah, Nevada, and southern California.

62. CHAENACTIS DC.

Stems essentially scapose. Many-stemmed perennial, 12 cm. high or less. **1. C. nevadensis.**
Stems leafy.
Plants biennial or perennial ..... **2. C. douglasii.**
Plants annual.
Phyllaries attenuate ..... **3. C. carphoclinia.**
Phyllaries obtuse or merely acute.
Leaves simple and linear, or once pinnatifid. Plants quickly glabrate.
Marginal flowers much larger than the others; involucre 8 to 10 mm. high ..... **4. C. fremontii.**
Marginal flowers scarcely larger than the others; involucre about 15 mm. high ..... **5. C. xantiana.**
Leaves usually bipinnatifid. Tomentum more or less persistent.
Involucre 12 to 15 mm. high; corollas about 10 mm. long. **6. C. macrantha.**
Involucre 6 to 9 mm. high; corollas about 5 mm. long.
Squamellae of pappus (in the central flowers) about two-thirds as long as the corollas ..... **7. C. stevioides.**
Squamellae all short ..... **7a. C. stevioides brachypappa.**

1. Chaenactis nevadensis (Kellogg) A. Gray, Bot. Calif. **1**: 391. 1876.
Hymenopappus nevadensis Kellogg, Proc. Calif. Acad. **5**: 46. 1873.
Chaenactis douglasii alpina A. Gray, Syn. Fl. **1**^{2}: 341. 1884.
Chaenactis alpina Jones, Proc. Calif. Acad. II. **5**: 699. 1895.

Chaenactis leucopsis Greene, Leaflets **2**: 221. 1912.
Chaenactis rubella Greene, Leaflets **2**: 221. 1912.
Rocky ridges of the spruce and alpine belts. Montana to Colorado, California, and Oregon.

2. Chaenactis douglasii (Hook.) Hook. & Arn. Bot. Beechey Voy. 354. 1840.
Hymenopappus douglasii Hook. Fl. Bor. Amer. **1**: 316. 1834.
Chaenactis achilleaefolia Hook. & Arn. Bot. Beechey Voy. 354. 1840.
Macrocarphus achilleaefolius Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 376. 1841.
Chaenactis augustifolia Greene, Leaflets **2**: 223. 1912.
Chaenactis brachiata Greene, Leaflets **2**: 224. 1912.
Plains and foothills upward to the spruce belt. Montana to Washington, California, and New Mexico.

3. Chaenactis carphoclinia A. Gray in Torr. U. S. & Mex. Bound. Bot. 94. 1859.
Chaenactis paleolifera A. Nels. Bot. Gaz. **47**: 434. 1909.
Desert areas, dry hillsides, and rocky canyons of the Covillea and artemisia belts. New Mexico to Nevada and southern California, southward into Mexico.

4. Chaenactis fremontii A. Gray, Proc. Amer. Acad. **19**: 30. 1883.
Desert areas of the Covillea belt. Nevada, Arizona, and southern California.

5. Chaenactis xantiana A. Gray, Proc. Amer. Acad. **6**: 545. 1865.
Chaenactis glabriuscula megacephala A. Gray, Proc. Bost. Soc. Nat. Hist. **7**: 146, in part. 1859.
Chaenactis xantiana integrifolia A. Gray, Proc. Amer. Acad. **6**: 545. 1865.
Desert areas, dry canyons, and foothills of the artemisia belt. Southern Oregon to Arizona and California.

6. Chaenactis macrantha D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 171. *pl. 18, f. 1.* 1871.
Desert areas, canyons, and foothills of the Covillea and artemisia belts. Utah to eastern California and Arizona.

7. Chaenactis stevioides Hook. & Arn. Bot. Beechey Voy. 353. 1840.
Chaenactis floribunda Greene, Pittonia **3**: 168. 1897.
Plains, desert areas, and canyons of the Covillea and artemisia belts. Wyoming to Idaho, southern California, and Mexico.

7a. Chaenactis stevioides brachypappa (A. Gray) H. M. Hall, Univ. Calif. Publ. Bot. **3**: 194. 1907.
Chaenactis brachypappa A. Gray, Proc. Amer. Acad. **8**: 390. 1872.
Sandhills and desert areas. Southern Nevada and southern California.

63. CHAMAECHAENACTIS Rydb.

1. Chamaechaenactis scaposa (Eastw.) Rydb. Bull. Torrey Club **33**: 156. 1906.
Chaenactis scaposa Eastw. Zoe **2**: 231. 1891.
Actinella carnosa A. Nels. in Coulter, New Man. Rocky Mount. 559. 1909.
Plains and desert areas of the artemisia belt. Southwestern Colorado and eastern Utah.

64. BAHIA Lag.

Leaves once to thrice ternately divided into oblanceolate or oblong lobes; pappus wanting ..... **1. B. dissecta.**

Leaves entire, lanceolate or elliptic to ovate; pappus present.
Phyllaries caudate-attenuate, sparsely puberulous; plant puberulous, not stipitate-glandular. Leaves chiefly basal_____2. **B. ourolepis.**
Phyllaries obtuse or merely acute, stipitate-glandular; plants stipitate-glandular.
Leaves chiefly basal, mostly lanceolate, ovate or oval-ovate.
3. **B. nudicaulis.**
Stem leafy throughout; leaves chiefly elliptic_____4. **B. oblongifolia.**

1. **Bahia dissecta** (A. Gray) Britton, Trans. N. Y. Acad. **8:** 68. 1889.
Amauria? dissecta A. Gray, Mem. Amer. Acad. n. ser. **4:** 104. 1849.
Villanova chrysanthemoides A. Gray, Pl. Wright. **2:** 96. 1853.
Bahia chrysanthemoides A. Gray, Proc. Amer. Acad. **19:** 28. 1883.
Villanova dissecta Rydb. Bull. Torrey Club **37:** 333. 1910.
Amauriopsis dissecta Rydb. N. Amer. Fl. **34:** 37. 1914.
Pinyon, yellow pine, and aspen belts. Wyoming to New Mexico and Arizona.

2. **Bahia ourolepis** Blake, Proc. Biol. Soc. Washington **35:** 175. 1922.
Artemisia belt. Eastern Utah.

3. **Bahia nudicaulis** A. Gray, Proc. Amer. Acad. **19:** 27. 1883.
Schkuhria integrifolia A. Gray, Amer. Nat. **8:** 213. 1874. Not *Bahia integrifolia* DC. 1836.
Bahia desertorum Jones, Zoe **2:** 249. 1891.
Platyschkuhria integrifolia Rydb. Bull. Torrey Club **33:** 155. 1906.
Plains and desert areas of the artemisia, pinyon, and yellow pine belts. Wyoming, Colorado, and Utah.

4. **Bahia oblongifolia** A. Gray, Proc. Amer. Acad. **19:** 27. 1883.
Schkuhria integrifolia oblongifolia A. Gray, Amer. Nat. **8:** 213. 1874.
Platyschkuhria oblongifolia Rydb. Bull. Torrey Club **33:** 155. 1906.
Artemisia belt. Colorado, New Mexico, "Utah," and Arizona.

65. HULSEA Torr. & Gray

Leaves chiefly basal, obovate, permanently floccose-tomentose; pappus about equaling the corolla tube_____1. **H. vestita.**
Stem leafy, the leaves linear to oblanceolate, green, viscid-pubescent; pappus much shorter than corolla tube_____2. **H. algida.**

1. **Hulsea vestita** A. Gray, Proc. Amer. Acad. **6:** 547. 1865.
Desert areas and volcanic hillsides of the artemisia and pinyon belts. Nevada and southern California.

2. **Hulsea algida** A. Gray, Proc. Amer. Acad. **6:** 547. 1865.
Hulsea caespitosa Nels. & Kennedy, Proc. Biol. Soc. Washington **19:** 38. 1906.
Hulsea nevadensis Gandog. Bull. Soc. Bot. France **65:** 44. 1918.
Mountain sides and summits of the spruce and subalpine belts. Nevada and California.

66. TRICHOPTILIUM A. Gray

1. **Trichoptilium incisum** A. Gray in Torr. U. S. & Mex. Bound. Bot. 97. 1859.
Psathyrotes incisa A. Gray, Mem. Amer. Acad. n. ser. **5:** 322. 1854.
Desert areas of the Covillea belt. Arizona, southern Nevada, and southern California.

67. ACTINEA Juss.

Leaves deeply pinnatifid or pinnately lobed.
Heads large, the disk about 2 cm. wide; involucre densely pilose-tomentose, about 1 cm. high or more_____1. A. grandiflora.
Heads small or medium, the disk 1.5 cm. wide or less; involucre not densely pilose-tomentose, 8 mm. high or less.
Plants multicipital perennials, 30 cm. high or usually less.
Plant green, not canescent_____2. A. richardsoni.
Plant canescent-pubescent_____3. A. canescens.
Plants biennial (rarely perennial ?), not multicipital, usually more than 30 cm. high.
Plant green, glabrous or merely puberulous; leaf divisions comparatively broad, about 2 mm. wide_____4. A. lemmoni.
Plant cinereous-strigillose; leaf divisions narrow, 1 mm. wide or less. 5. A. biennis.

Leaves entire.
Stems bearing several leaves_____6. A. leptoclada ivesiana.
Stems (scapes) leafless, the leaves all basal.
Heads nearly or quite sessile, the whole plant not over 3 cm. high. 7. A. depressa.
Heads peduncled; plants 3.5 to 25 cm. high.
Scapes sparsely villous or appressed-silky.
Leaves linear-spatulate or linear-oblanceolate, distinctly broadened above_____9b. A. acaulis arizonica.
Leaves essentially linear, scarcely broadened above. 10. A. scaposa linearis.
Scapes densely villous.
Leaves densely villous_____9a. A. acaulis lanigera.
Leaves essentially glabrous or sparsely villous.
Caudex much branched, with very stout and woolly branches; peduncles densely and loosely villous, 3.5 to 9 cm. long. 8. A. torreyana.
Caudex less branched, the branches rather slender, not strongly woolly; peduncles usually longer_____9. A. acaulis simplex.

1. Actinea grandiflora (Torr. & Gray) Kuntze, Rev. Gen. Pl. 1: 303. 1891.
Actinella grandiflora Torr. & Gray; A. Gray, Journ. Bost. Soc. Nat. Hist. 5: 109. 1845.
Rydbergia grandiflora Greene, Pittonia 3: 270. 1898.
Spruce and subalpine belts. Wyoming, Colorado, and Utah.

2. Actinea richardsoni (Hook.) Kuntze, Rev. Gen. Pl. 1: 303. 1891.
Picradenia richardsoni Hook. Fl. Bor. Amer. 1: 317. 1834.
Actinella richardsoni Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 379. 1841.
Actinella richardsoni floribunda A. Gray, Mem. Amer. Acad. n. ser. 4: 101. 1849.
Picradenia pumila Greene, Pittonia 3: 271. 1898.
Picradenia floribunda Greene, Pittonia 3: 272. 1898.
Picradenia macrantha A. Nels. Bot. Gaz. 28: 130. 1899.
Hymenoxys floribunda Cockerell, Bull. Torrey Club 31: 485. 1904.
Hymenoxys pumila Rydb. Bull. Torrey Club 33: 156. 1906.
Hymenoxys macrantha Rydb. Bull. Torrey Club 33: 156. 1906.
Canyons and rocky hillsides of the artemisia belt, upward to the spruce belt. Saskatchewan to New Mexico, Arizona, and Utah.

3. Actinea canescens (D. C. Eaton) Blake.

Actinella richardsoni canescens D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 175. 1871.

Picradenia canescens Greene, Pittonia **3**: 271. 1898.

Hymenoxys canescens Cockerell, Bull. Torrey Club **31**: 484. 1904.

Rocky slopes of the pinyon and yellow pine belts. Utah (?) and Nevada.

4. Actinea lemmoni (Greene) Blake.

Actinella richardsonii D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 175. 1871. Not *A. richardsoni* Nutt. 1841.

Picradenia lemmoni Greene, Pittonia **3**: 272. 1898.

Hymenoxys lemmoni Cockerell, Bull. Torrey Club **31**: 477. 1904.

Hymenoxys lemmoni greenei Cockerell, Bull. Torrey Club **31**: 479. 1904.

Hymenoxys greenei Rydb. Bull. Torrey Club **37**: 448. 1910.

Canyons and slopes of the yellow pine, aspen, and spruce belts. California and western Nevada.

5. Actinea biennis (A. Gray) Kuntze, Rev. Gen. Pl. **1**: 303. 1891.

Actinella richardsoni A. Gray, Bot. Calif. **1**: 394. 1876. Not *A. richardsoni* Nutt. 1841.

Actinella biennis A. Gray, Proc. Amer. Acad. **13**: 373. 1878.

Picradenia biennis Greene, Pittonia **3**: 272. 1898.

Hymenoxys biennis H. M. Hall, Univ. Calif. Publ. Bot. **3**: 204. 1907.

Canyons and rocky hillsides of the Covillea, artemisia, and pinyon belts. Southern Utah, Nevada, and Arizona.

6. Actinea leptoclada ivesiana (Greene) Macbr. Contr. Gray Herb. n. ser. **56**: 44. 1918.

Tetraneuris ivesiana Greene, Pittonia **3**: 269. 1898.

Dry mountain sides of the artemisia, pinyon, and yellow pine belts. Southern Utah, New Mexico, and Arizona.

7. Actinea depressa (Torr. & Gray) Kuntze. Rev. Gen. Pl. **1**: 303. 1891.

Actinella depressa Torr. & Gray, Mem. Amer. Acad. n. ser. **4**: 100. 1849.

Tetraneuris depressa Greene, Pittonia **3**: 266. 1898.

Spruce and subalpine belts. Colorado, Utah, and northern New Mexico.

8. Actinea torreyana (Nutt.) Macbr. Contr. Gray Herb. n. ser. **56**: 44. 1918.

Actinella torreyana Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 379. 1841.

Tetraneuris torreyana Greene, Pittonia **3**: 265. 1898.

Artemisia, pinyon, and yellow pine belts. Wyoming, Colorado, and Utah.

9. Actinea acaulis simplex (A. Nels.) Macbr. Contr. Gray Herb. n. ser. **56**: 43. 1918.

Tetraneuris simplex A. Nels. Bot. Gaz. **28**: 127. 1899.

Tetraneuris epunctata A. Nels. Bot. Gaz. **37**: 275. 1904.

Artemisia belt. South Dakota to Colorado and Utah.

9a. Actinea acaulis lanigera (Daniels) Blake.

Actinella lanata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 379. 1841. Not *A. lanata* Pursh, 1814.

Tetraneuris lanata Greene, Pittonia **3**: 265. 1898.

Tetraneuris lanigera Daniels, Univ. Mo. Stud. Scl. **2²**: 393. 1911.

Pinyon belt, upward to the subalpine belt. Wyoming to northern New Mexico and Utah.

9b. Actinea acaulis arizonica (Greene) Blake.

Actinella acaulis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 174. 1871. Not *A. acaulis* Nutt. 1818.

Tetraneuris arizonica Greene, Pittonia **3**: 266. 1897.

Canyons and dry mountain slopes, yellow pine and aspen belts. Colorado, Utah, Arizona, and Nevada.

10. Actinea scaposa linearis (Nutt.) Robinson, Proc. Amer. Acad. **49**: 506. 1913.

Actinella scaposa linearis Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 379. 1841.

Tetraneuris linearis Greene, Pittonia **3**: 267. 1898.

Plains and hillsides of the artemisia and pinyon belts. Kansas to Texas, New Mexico, and southeastern Utah.

68. HELENIUM L. Sneezeweed

Stem winged, puberulous; leaves lanceolate, all essentially similar; disk about 1 cm. thick; rays 5 to 10 mm. long; heads usually numerous. **1. H. montanum.**

Stem wingless, tomentulose, glabrescent; lower leaves obovate or oblanceolate, much larger than the upper; disk 2 cm. thick or more; rays about 2.5 cm. long; heads few **2. H. hoopesii.**

1. Helenium montanum Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 384. 1841.

Helenium autumnale D. C. Eaton in King, Geol. Expl. 40th. Par. **5**: 175. 1871. Not *H. autumnale* L. 1753.

Meadows and canyons of the artemisia, pinyon, and yellow pine belts. British Columbia to Montana, Kansas, New Mexico, and Nevada.

2. Helenium hoopesii A. Gray, Proc. Acad. Phila. **1863**: 65. 1863. Orange sneezeweed.

Dugaldea hoopesii Rydb. Mem. N. Y. Bot. Gard. **1**: 425. 1900.

Yellow pine, aspen, spruce, and subalpine belts. Montana to New Mexico, Arizona, and California.

69. GAILLARDIA Foug. Gaillardia

Stem naked, the leaves all basal. Leaves oval, entire, 1.5 to 2.5 cm. wide. **1. G. parryi.**

Stem leafy at least below, or, if rarely naked, the leaves toothed or lobed.

Leaves strictly entire, obovate to oblanceolate. Disk yellow. **2. G. spathulata.**

Leaves usually toothed or lobed, if entire linear or linear-spatulate.

Disk yellow.

Stem leafy throughout; leaves deeply pinnatifid; plant perennial. **3. G. flava.**

Stem leafy chiefly toward base; leaves toothed to pinnatifid; plants annual.

Pappus squamellae muticous, without distinct midrib **4. G. arizonica.**

Pappus squamellae with distinct excurrent midrib. **4a. G. arizonica pringlei.**

Disk purple, at least in age.

Teeth of the disk corollas deltoid, merely acute.

Upper leaves, at least, deeply pinnatifid, with narrow divisions. **5. G. pinnatifida.**

Upper leaves entire or with one or two short lobes, the lower usually crenate or crenate-lobed **6. G. gracilis.**

Teeth of the disk corollas lance-acuminate **7. G. aristata.**

1. Gaillardia parryi Greene, Bull. Torrey Club **24**: 512. 1897.

Gaillardia acaulis A. Gray, Proc. Amer. Acad. **10**: 73. 1874. Not *G. acaulis* Pursh, 1814..

Plains and hillsides of the Covillea belt. Southwestern Utah and Arizona.

2. **Gaillardia spathulata** A. Gray, Proc. Amer. Acad. **12**: 59. 1876.
Plains and canyons of the artemisia, pinyon, and yellow pine belts. Utah.

3. **Gaillardia flava** Rydb. N. Amer. Fl. **34**: 139. 1915.
Canyons of the Colorado River. Utah.

4. **Gaillardia arizonica** A. Gray, Syn. Fl. 1^2: 353. 1884.
Covillea belt. Southern Utah, Nevada, and Arizona.

4a. **Gaillardia arizonica pringlei** (Rydb.) Blake.
Gaillardia pringlei Rydb. N. Amer. Fl. **34**: 139. 1915.
Covillea belt. Utah and Arizona.

5. **Gaillardia pinnatifida** Torr. Ann. Lyc. N. Y. **2**: 214. 1828.
Covillea, artemisia, pinyon, and yellow pine belts. Colorado to Texas, Arizona, and Utah.

6. **Gaillardia gracilis** A. Nels. Bot. Gaz. **37**: 276. 1904.
Gaillardia mearnsii Rydb. Bull. Torrey Club **37**: 443. 1910.
Covillea and artemisia belts. Southern Utah and Arizona.

7. **Gaillardia aristata** Pursh, Fl. Amer. Sept. 573. 1814.
Plains and mountain sides of the yellow pine belt, upward to 2,400 meters. Saskatchewan to Colorado, central Utah, Oregon, and British Columbia.

70. DYSSODIA Cav.

Involucre 4 to 6 mm. high; plants low, 20 cm. high or less; leaves with 3 to 7 linear-filiform entire lobes, or entire and acerose-filiform.
Leaves entire, acerose; pappus paleae all dissected into 3 to 5 bristles.
1. D. acerosa.
Leaves pinnatisect, with linear-filiform lobes; pappus paleae 1 to 3-awned or awnless, not dissected into bristles.
Paleae of pappus not all awned, the short outer ones obtuse.
2. D. pentachaeta.
Paleae of pappus all awned——**3. D. thurberi.**
Involucre 10 to 15 mm. high; plants 30 to 60 cm. high; leaves toothed or pinnately lobed.
Plant glabrous——**4. D. porophylloides.**
Plant pubescent——**5. D. cooperi.**

1. **Dyssodia acerosa** DC. Prodr. **5**: 641. 1836.
Aciphyllaea acerosa A. Gray, Mem. Amer. Acad. n. ser. **4**: 91. 1849.
Hymenatherum acerosum A. Gray, Pl. Wright. **1**: 115. 1852.
Dyssodia fusca A. Nels. Bot. Gaz. **47**: 436. 1909.
Plains and hillsides of the Covillea belt. Nevada to Texas and Mexico.

2. **Dyssodia pentachaeta** (DC.) Robinson, Proc. Amer. Acad. **49**: 507. 1913.
Hymenatherum pentachaetum DC. Prodr. **5**: 642. 1836.
Thymophylla pentachaeta Small, Fl. Southeast. U. S. 1295. 1903.
Covillea belt. Southern Utah to Mexico and Texas.

3. **Dyssodia thurberi** (A. Gray) A. Nels. Bot. Gaz. **47**: 436. 1909.
Hymenatherum thurberi A. Gray, Proc. Amer. Acad. **19**: 41. 1883.
Dyssodia cupulata A. Nels. Bot. Gaz. **47**: 435. 1909.
Thymophylla thurberi Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 191. 1913.
Covillea belt. Texas to Nevada and Mexico.

4. **Dyssodia porophylloides** A. Gray, Mem. Amer. Acad. n. ser. **5**: 322. 1854.
Clomenocoma laciniata Rydb. N. Amer. Fl. **34**: 166. 1915.
Clomenocoma porophylloides Rydb. N. Amer. Fl. **34**: 166. 1915

Desert areas of the Covillea belt; Needles, California. Arizona to southern California and Lower California.

5. **Dyssodia cooperi** A. Gray, Proc. Amer. Acad. **9**: 201. 1874.
Clomenocoma cooperi Rydb. N. Amer. Fl. **34**: 166. 1915.
Desert areas of the Covillea belt. Arizona, southern Nevada, and California.

71. POROPHYLLUM Adans.

1. **Porophyllum leucospermum** Greene, Leaflets **2**: 155. 1911.
Dry canyons of the Covillea belt. Nevada.

72. PECTIS L.

Pappus a crown of short squamellae, sometimes with 1 or 2 awns; leaves (especially the upper) somewhat scarious-dilated at base. **1. P. angustifolia.**

Pappus usually of 12 to 18 barbate bristles; leaves not dilated at base. **2. P. papposa.**

1. **Pectis angustifolia** Torr. Ann. Lyc. N. Y. **2**: 214. 1828.
Pectis papposa sessilis Jones, Contr. West. Bot. **12**: 46. 1908.
Covillea and artemisia belts. Kansas to Texas, Colorado, southwestern Utah, and Mexico. Known as the headache plant, and used by Indians.

2. **Pectis papposa** Harv. & Gray; A. Gray, Mem. Amer. Acad. **n. ser. 4**: 62. 1849.
Pectis tenella Rothr. in Wheeler, Rep. U. S. Surv. 100th Merid. 171. 1878.
Not *P. tenella* DC. 1836.
Pectis palmeri S. Wats. Proc. Amer. Acad. **24**: 58, in part. 1889.
Covillea, artemisia, pinyon, and yellow pine belts. South Dakota to California and Mexico.

Pectis rusbyi Greene, of northern Arizona, may occur in Nevada. It may be distinguished from the two preceding species by its long pedicels, 3 to 6 cm. long.

73. ANTHEMIS L. Camomile

1. **Anthemis cotula** L. Sp. Pl. 894. 1753.
Maruta cotula DC. Prodr. **6**: 13. 1837.
About settlements; introduced from the Old World.

74. ACHILLEA L. Yarrow

Phyllaries with pale brown or straw-colored margin——1. **A. lanulosa.**
Phyllaries with dark brown margin——1a. **A. lanulosa alpicola.**

1. **Achillea lanulosa** Nutt. Journ. Acad. Phila. **7**: 36. 1834.
Plains and mountain sides, upward to the subalpine belt. Saskatchewan to British Columbia, California, and Mexico.

1a. **Achillea lanulosa alpicola** Rydb. Mem. N. Y. Bot. Gard. **1**: 426. 1900.
Achillea subalpina Greene, Leaflets **1**: 145. 1905.
Achillea alpicola Rydb. Bull. Torrey Club **33**: 157. 1906.
Spruce and alpine belts. Hudson Bay and Alberta to New Mexico and California.

75. MATRICARIA L. False-camomile

1. **Matricaria matricarioides** (Less.) Porter, Mem. Torrey Club **5**: 341. 1894.
Santolina suaveolens Pursh, Fl. Amer. Sept. 520. 1814.
Artemisia matricarioides Less. Linnaea **6**: 210. 1831.
Matricaria discoidea DC. Prodr. **6**: 50. 1837.

Matricaria suaveolens Buch. Fl. Nord. Tief. 496. 1894. Not *M. suaveolens* L. 1755.

About settlements and sheep camps; introduced in the Eastern States. Alaska to California and Arizona.

76. CHRYSANTHEMUM L. CHRYSANTHEMUM

Leaves toothed to pinnatifid-lobed, the lower obovate, the upper linear or oblanceolate, green; heads solitary at tips of branches, with long white rays; plant essentially glabrous_____1. C. leucanthemum pinnatifidum.

Leaves with a pair of small lobes at base, otherwise merely crenate, oblong-ovate, grayish-pubescent; heads numerous, corymbose-panicled, with short rays or usually none; plant canescent-puberulous_____2. C. majus.

1. **Chrysanthemum leucanthemum pinnatifidum** Lec. & Lam. Cat. Pl. France 227. 1848.

About settlements. Naturalized nearly throughout North America.

2. **Chrysanthemum majus** (Desf.) Aschers. Fl. Brand. 329. 1864.
Tanacetum balsamita L. Sp. Pl. 845. 1753.
Balsamita major Desf. Act. Soc. Hist. Nat. Paris 1: 3. 1792.
Chrysanthemum balsamita Baill. Hist. Pl. 8: 311. 1886. Not *C. balsamita* L. 1753.

Escaped from cultivation, chiefly in eastern United States. Provo, Utah.

77. TANACETUM L. TANSY

Plant tall, 1 meter high or more, very leafy throughout; leaves all bipinnatifid or tripinnatifid, broad, green; pappus coroniform_____1. T. vulgare.

Plants low, the stems usually naked above; at least the upper leaves entire or merely pinnatifid.

Plant green, nearly glabrous_____4. T. diversifolium.

Plant silvery-canescent.

Pappus present, coroniform, about 5-toothed; heads 1 or 2. 5. T. compactum.

Pappus none; heads several or numerous.

Lower leaves bipinnatifid or tripinnatifid; receptacle pubescent. 2. T. potentilloides.

Lower leaves pedately 3 or 5-cleft or lobed; receptacle glabrous. 3. T. canum.

1. **Tanacetum vulgare** L. Sp. Pl. 844. 1753.

Waste places; Washoe County, Nevada. Introduced and widespread in North America.

2. **Tanacetum potentilloides** A. Gray, Proc. Amer. Acad. 9: 204. 1874.
Artemisia potentilloides A. Gray, Proc. Amer. Acad. 6: 551. 1865.
Sphaeromeria potentilloides Heller, Muhlenbergia 1: 7. 1900.
Vesicarpa potentilloides Rydb. N. Amer. Fl. 34: 242. 1916.

Valleys and alkaline meadows of the artemisia belt; Western Nevada. Oregon, California, and Nevada.

3. **Tanacetum canum** D. C. Eaton in King, Geol. Expl. 40th Par. 5: 179. *pl. 19, f. 8–14.* 1871.
Sphaeromeria cana Heller, Muhlenbergia 1: 7. 1900.

Rocky slopes of the yellow pine, aspen, and spruce belts. Nevada, eastern California, and Oregon.

4. **Tanacetum diversifolium** D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 180. *pl. 19, f. 1–7.* 1871.
Sphaeromeria diversifolia Rydb. N. Amer. Fl. **34**: 242. 1916.
Pinyon and yellow pine belts. Utah.

5. **Tanacetum compactum** H. M. Hall, Muhlenbergia **2**: 343. 1916.
Chamartemisia compacta Rydb. N. Amer. Fl. **34**: 243. 1916.
Head of Lee Canyon, Charlestown Mountains, Nevada.

78. COTULA L.

1. **Cotula australis** (Sieber) Hook. f. Fl. Nov. Zeland. **1**: 128. 1852.
Anacyclus australis Sieber; Spreng. Syst. Veg. **3**: 497. 1826.
"Utah." Introduced on the west coast of North America.

79. ARTEMISIA L. Wormwood

Plants shrubs or undershrubs, with foliage silvery-canescent on both sides.
Leaves twice to thrice pinnatifid into linear divsions. Stems several to many, 20 to 50 cm. high; heads numerous, small, racemously arranged. **4. A. frigida.**
Leaves linear to spatulate or cuneate, entire, tridentate or trifid.
Leaves linear to linear-spatulate, entire or rarely tridentate at apex.
Inflorescence leafy-bracted——**17. A. cana.**
Leaves tridentate to 3-parted, or if entire linear-filiform.
Leaves entire or 3-parted, linear-filiform. Heads very numerous, tiny. **3. A. filifolia.**
Leaves tridentate or trifid, their divisions linear or broader.
Leaves trifid, the divisions linear or linear-spatulate—**23. A. tripartita.**
Leaves tridentate (rarely 5-dentate) at apex.
Heads very numerous, in dense panicles; shrubs 0.5 to 4 meters high.
Leaves cuneate——**21. A. tridentata.**
Leaves linear to linear-cuneate—**21a. A. tridentata angustifolia.**
Heads fewer, usually racemose-spicate; undershrubs usually under 40 cm. high.
Lower leaves glabrate or glabrescent; plant somewhat viscid. **18. A. rothrockii.**
Lower leaves not glabrate; plant not viscid.
Involucre 5 mm. high. Shrub, 1 meter high or less; leaves cuneate, 4 to 7 mm. wide; outer involucral bracts tomentose, inner glabrescent——**20. A. spiciformis.**
Involucre 4 mm. high or less.
Involucre glabrescent, slender, 3 mm. high, 1.5 mm. wide, yellowish brown——**22. A. nova.**
Involucre canescent or tomentose.
Heads thyrsoid-panicled, numerous; involucre about 2 mm. high, canescent——**16. A. bigelovii.**
Heads racemose-spicately arranged, rather few; involucre 3 to 4 mm. high, tomentose——**19. A. arbuscula.**
Plants herbs or, if rarely shrubby, the foliage not silvery-cancescent.
Plants undershrubs, about 10 cm. high.
Branchlets spiniform; leaves small, about 1 cm. long, roundish in outline, 2 to 3-pinnatifid; plant dull-tomentose——**25. A. spinescens.**
Branchlets not spiniform; leaves pinnatifid into 3 to 7 linear-spatulate divi sions; plant slightly canescent or glabrate——**24. A. pygmaea**

Plants herbs, often 1 meter high.
Leaves, at least the lower, once to thrice pinnatifid essentially to the midrib, the divisions usually linear or linear-spatulate.
Leaves (at least the lower) once pinnatifid into linear entire revolute segments, tomentose at least beneath.
Leaves tomentose on both sides; involucre densely tomentose.
15. A. carruthii.
Leaves green above; involucre not densely tomentose.
Heads comparatively few, 3 to 4 mm. high, in a narrow racemiform panicle----------**9. A. incompta.**
Heads very numerous, 2 to 3 mm. high, in an often open panicle.
Heads about 2 mm. high; leaf lobes linear-filiform, 1 mm. wide or less----------**14. A. wrightii.**
Heads about 3 mm. high; leaf lobes mostly linear or broader, more than 1 mm. wide----------**11. A. mexicana.**
Leaves (at least the lower) twice to thrice pinnatifid.
Leaves green, glabrous or essentially so.
Primary lobes of leaves laciniately toothed or pinnatifid; introduced biennial weed----------**6. A. biennis.**
Primary lobes of leaves once or twice pinnatifid, with linear divisions; indigenous alpine perennial----------**7. A. parryi.**
Leaves canescent or tomentose, at least beneath.
Leaf lobes broad, the rachis 2 to 5 mm. wide between the lobes.
Plant 1 meter high or less, with long narrow terminal panicle of nodding heads, these 5 to 7 mm. wide----**8. A. franserioides.**
Leaf lobes narrow, the rachis 1.5 mm. wide or less between the lobes.
Phyllaries with deep blackish brown or purplish black margins; plant 10 to 20 cm. high----------**5. A. scopulorum.**
Phyllaries pale-margined; plants usually 30 to 50 cm. high.
Involucre densely silky-pubescent----------**4. A. frigida.**
Involucre green, not densely pubescent.
Heads very numerous, panicled, about 2 mm. high; leaves sparsely silky-pubescent----------**2. A. forwoodii.**
Heads few, in a narrow racemiform panicle, about 3 mm. high; leaves tomentose beneath, green above----------
13. A. michauxiana.
Leaves entire or toothed, if pinnatifid not divided nearly to midrib.
Leaves green and glabrous on both sides----------**1. A. dracunculoides.**
Leaves densely canescent-tomentose, at least beneath.
Leaves chiefly lanceolate, entire or serrate, canescent-tomentose both sides----------**12. A. gnaphalodes.**
Leaves glabrate or glabrescent and green or greenish above, often deeply pinnatifid, the blades or their lobes often lance-linear or linear.
Leaf blades and their lobes usually lanceolate; involucre tomentose----------**10. A. ludoviciana.**
Leaf blades and their lobes usually linear or lance-linear; involucre canescent, the scarious margins of the bracts usually conspicuous----------**11. A. mexicana.**

1. Artemisia dracunculoides Pursh, Fl. Amer. Sept. 742. 1814.
Artemisia aromatica A. Nels. Bull. Torrey Club. **27**: 273. 1900.
Artemisia dracunculus glauca Hall & Clements, Phylog. Meth. Taxon. 116. 1923.

Artemisia, pinyon, and yellow pine belts. Manitoba to Texas and Lower California.

2. **Artemisia forwoodii** S. Wats. Proc. Amer. Acad. **25:** 133. 1890.
Artemisia camporum Rydb. N. Amer. Fl. **34:** 254. 1916.
Artemisia campestris pacifica Hall & Clements, Phylog. Meth. Taxon. 122. 1923.
Artemisia, pinyon, and yellow pine belts. Ontario to Saskatchewan, southward to Arizona.

3. **Artemisia filifolia** Torr. Ann. Lyc. N. Y. **2:** 211. 1828. SAND SAGEBRUSH.
Covillea and artemisia belts. Nebraska to Wyoming and Mexico.

4. **Artemisia frigida** Willd. Sp. Pl. **3:** 1838. 1904. MOUNTAIN SAGEBRUSH.

Artemisia belt, upward to the spruce belt. Minnesota to Alaska, southward to Texas.

5. **Artemisia scopulorum** A. Gray, Proc. Acad. Phila. **1863:** 66. 1863.
Alpine belts. Montana to New Mexico and Utah.

6. **Artemisia biennis** Willd. Phytogr. 11. 1794.
Artemisia, pinyon, and yellow pine belts. Widespread in the United States as a weed.

7. **Artemisia parryi** A. Gray, Proc. Amer. Acad. **7:** 361. 1868.
Subalpine belt. Colorado and Utah.

8. **Artemisia franserioides** Greene, Bull. Torrey Club **10:** 42. 1883.
Yellow pine belt. Colorado to Mexico.

9. **Artemisia incompta** Nutt. Trans. Amer. Phil. Soc. n. ser. **7:** 400. 1841.
Artemisia discolor incompta A. Gray, Syn. Fl. 1^2: 373. 1884.
Artemisia vulgaris discolor Hall & Clements, Phylog. Meth. Taxon. 74. 1823.
Artemisia, pinyon, and yellow pine belts. Montana and British Columbia, southward to Colorado and Utah.

10. **Artemisia ludoviciana** Nutt. Gen. Pl. **2:** 143. 1818.
?Artemisia cuneata Rydb. N. Amer. Fl. **34:** 269. 1916.
Artemisia underwoodii Rydb. Bull. Torrey Club **32:** 129. 1905.
Artemisia vulgaris ludoviciana Kuntze, Rev. Gen. Pl. **1:** 309. 1891.
Artemisia, pinyon, and yellow pine belts. Missouri to Texas and California.

11. **Artemisia mexicana** Willd.; Spreng. Syst. Veg. **3:** 490. 1826.
Artemisia silvicola Osterhout, Bull. Torrey Club **28:** 645. 1901.
Artemsia potens A. Nels. Bot. Gaz. **54:** 418. 1912.
Artemisia vulgaris mexicana Torr. & Gray, Fl. N. Amer. **2:** 421. 1843.
Artemisia, pinyon, and yellow pine belts. Colorado to California and Mexico.

12. **Artemisia gnaphalodes** Nutt. Gen. Pl. **2:** 143. 1818..
Artemisia purshiana Besser; Hook. Fl. Bor. Amer. **1:** 323. 1834.
Artemisia vulgaris gnaphalodes Kuntze, Rev. Gen. Pl. **1:** 309. 1891.
Artemisia rhizomata A. Nels. Bull. Torrey Club **27:** 34. 1900.
Artemisia diversifolia Rydb. Bull. Torrey Club **28:** 20. 1901.
Artemisia brittonii Rydb. Bull. Torrey Club **32:** 129. 1905.
Artemisia kennedyi A. Nels. Proc. Biol. Soc. Washington **18:** 175. 1905.
Artemisia albula Wooton, Contr. U. S. Nat. Herb. **16:** 193. 1913.
Artemisia, pinyon, and yellow pine belts. Michigan to Saskatchewan, southward to Mexico.

13. Artemisia michauxiana Besser; Hook. Fl. Bor. Amer. **1**: 324. 1834.

Artemisia graveolens Rydb. Bull. Torrey Club **24**: 296. 1897.

Artemisia belt, upward to the spruce belt. Saskatchewan to Washington, southward to Colorado and Nevada.

14. Artemisia wrightii A. Gray, Proc. Amer. Acad. **19**: 48. 1883.

Artemisia bakeri Greene, Pl. Baker. **3**: 31. 1903.

Artemisia vulgaris wrightii Hall & Clements, Phylog. Meth. Taxon. 80. 1923.

Artemisia, pinyon, and yellow pine belts. Colorado, New Mexico, Utah, and Arizona.

15. Artemisia carruthii Wood; Carruth, Trans. Kans. Acad. **5**: 51. 1877.

Artemisia kansana Britton; Britt. & Brown, Illustr. Fl. **3**: 466. 1898.

Artemisia, pinyon, and yellow pine belts. Missouri to Utah and Texas.

16. Artemisia bigelovii A. Gray, U. S. Rep. Expl. Miss. Pacif. **4**: 110. 1857.

Artemisia belt. Colorado to Texas and Arizona.

17. Artemisia cana Pursh, Fl. Amer. Sept. 521. 1814.

Artemisia belt, upward to the spruce belt. Saskatchewan and Alberta to Utah.

18. Artemisia rothrockii A Gray in Brewer & Wats. Bot. Calif. **1**: 618. 1876.

Artemisia tridentata rothrocki Hall & Clements, Phylog. Meth. Taxon. 138. 1923.

Yellow pine belt. California and Nevada.

19. Artemisia arbuscula Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 398. 1841.

LOW SAGEBRUSH.

Artemisia tridentata arbuscula Hall & Clements, Phylog. Meth. Taxon. 138. 1923.

Yellow pine, aspen, and spruce belts. Wyoming to California and Oregon.

20. Artemisia spiciformis Osterhout, Bull. Torrey Club **27**: 507. 1900.

?*Artemisia vaseyana* Rydb. N. Amer. Fl. **34**: 283. 1916.

Artemisia belt, upward to the spruce belt. Washington to Colorado and Utah.

21. Artemisia tridentata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 398. 1841.

SAGEBRUSH.

Characteristic plant of the artemisia belt, ranging upward to the spruce belt. South Dakota to British Columbia, southward to New Mexico.

21a. Artemisia tridentata angustifolia A. Gray, Proc. Amer. Acad. **19**: 49. 1883.

Artemisia angusta Rydb. N. Amer. Fl. **34**: 283. 1916.

Artemisia belt. Washington to Nevada and California.

22. Artemisia nova A. Nels. Bull. Torrey Club **27**: 274. 1900.

SMALL SAGEBRUSH.

Artemisia tridentata nova Hall & Clements, Phylog. Meth. Taxon. 137. 1923.

Pinyon, yellow pine, aspen, and spruce belts. Wyoming to New Mexico and Arizona.

23. Artemisia tripartita Rydb. Mem. N. Y. Bot. Gard. **1**: 432. 1900.

Artemisia trifida Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 398. 1841. Not *A. trifida* Turcz. 1832.

Artemisia tridentata trifida Hall & Clements, Phylog. Meth. Taxon. 137. 1923

Artemisia belt, upward to the spruce belt. Montana to Nevada and Washington.

24. **Artemisia pygmaea** A. Gray, Proc. Amer. Acad. **21**: 413. 1886.
Artemisia belt. Nevada and Utah.

25. **Artemisia spinescens** D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 180. 1871. BUD SAGEBRUSH.
. *Picrothamnus desertorum* Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 417. 1841.
Not *Artemisia desertorum* Spreng. 1826.
Artemisia belt. Wyoming to Oregon, southward to New Mexico and California.

80. RAILLARDELLA A. Gray

1. **Raillardella scaposa nevadensis** (Nels. & Kennedy) Blake.
Raillardella nevadensis Nels. & Kennedy, Proc. Biol. Soc. Washington **19**: 38. 1906.
Spruce and subalpine belts; Mount Rose, Nevada.

81. LEPIDOSPARTUM A. Gray

Branches glabrate, no obviously striate; heads 10 to 18-flowered; involucre 4 to 6 mm. high, essentially glabrous, its phyllaries 1.5 mm. wide or less; achenes glabrous----------1. **L. squamatum.**
Branches persistently tomentose, strongly striate; heads 4 or 5-flowered; involucre 8 to 10 mm. high, tomentose at least toward base, its phyllaries about 3 mm. wide; achenes densely silky----------2. **L. latisquamum.**

1. **Lepidospartum squamatum** A. Gray, Proc. Amer. Acad. **19**: 50. 1883.
Linosyris squamata A. Gray, Proc. Amer. Acad. **8**: 290. 1870.
Covillea belt. California, southern Nevada, and Arizona.

2. **Lepidospartum latisquamum** S. Wats. Proc. Amer. Acad. **25**: 133. 1890.
Lepidospartum striatum Coville, Proc. Biol. Soc. Washington **7**: 73. 1892.
Artemisia belt. Nevada.

82. ARNICA L. ARNICA

Heads discoid.
Leaves slightly denticulate or entire; pappus sordid----------1. **A. parryi.**
Leaves coarsely toothed; pappus bright white----------2. **A. discoidea.**
Heads radiate.
Basal leaves cordate or broadly ovate, usually long-petioled.
Pappus bristles brownish white, distinctly short-plumose.
Leaves entire----------3. **A. nevadensis.**
Leaves denticulate or dentate----------4. **A. diversifolia.**
Pappus bristles clear white or slightly brownish-tinged, merely barbellate or apparently smooth.
Phyllaries bearing numerous long-stalked glands----5. **A. paniculata.**
Phyllaries bearing sessile glands or none.
Involucre densely villous at base; basal leaves conspicuously cordate. **6. A. cordifolia.**
Involucre rather densely sessile-glandular, its long hairs few or none; basal leaves rarely cordate----------7. **A. latifolia.**
Basal leaves lanceolate or lance-ovate, usually short-petioled.
Pappus bristles subplumose.
Achenes glandular, not hispidulous----------8. **A. longifolia.**
Achenes hispidulous as well as glandular.
Involucre densely glandular, the long hairs few or none.--9. **A. arcana.**

Involucre densely pubescent as well as glandular.
Stem leaves oblong-elliptic or ovate, sessile with clasping base, nearly glabrous except for a few hairs on the veins and short hairs near the margin----------10. **A. amplexicaulis.**
Stem leaves of different shape, usually densely pubescent or puberulent above----------11. **A. mollis.**
Pappus bristles barbellate, not subplumose.
Stem leaves several pairs.
Stem sparsely to densely puberulous, villous, or subtomentose.
12. A. foliosa.
Stem densely and canescently lanate-tomentose.
12a. A. foliosa incana.
Stem leaves only 1 to 3 pairs, the upper much reduced, linear-lanceolate or linear.
Stem with tufts of brown wool at base----------13. **A. pedunculata.**
Stem without tufts of brown wool at base----------14. **A. fulgens.**

1. **Arnica parryi** A. Gray, Amer. Nat. **8**: 213. 1874.
Spruce and alpine belts. Alberta and British Columbia, southward to New Mexico, Utah, and Oregon.

2. **Arnica discoidea** Benth. Pl. Hartw. 319. 1849.
Yellow pine belt. Washington to California and western Nevada.

3. **Arnica nevadensis** A. Gray, Proc. Amer. Acad. **19**: 55. 1883.
Yellow pine belt. California and western Nevada.

4. **Arnica diversifolia** Greene, Pittonia **4**: 171. 1900.
Arnica latifolia viscidula A. Gray, Syn. Fl. 1^2: 381. 1884.
Spruce belt. British Columbia to California and Utah.

5. **Arnica paniculata** A. Nels. in Coulter, New Man. Rocky Mount. 572. 1909.
Yellow pine belt. Montana to Utah.

6. **Arnica cordifolia** Hook. Fl. Bor. Amer. **1**: 331. 1834.
Arnica pumila Rydb. Mem. N. Y. Bot. Gard. **1**: 433. 1900.
Arnica chionophila Greene, Pittonia **4**: 171. 1900.
Yellow pine, aspen, spruce, and subalpine belts. British Columbia to Colorado and California.

7. **Arnica latifolia** Bong. Mém. Acad. St. Pètersb. VI. Math. Nat. **2**: 147. 1832.
Arnica ventorum Greene, Pittonia **4**: 173. 1900.
Arnica platyphylla A. Nels. Bot. Gaz. **31**: 407. 1901.
?*Arnica jonesii* Rydb. Fl. Rocky Mount. 979. 1917.
Spruce belt. Alaska to Utah.

8. **Arnica longifolia** D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 186. 1871.
Arnica caudata Rydb. Bull. Torrey Club **37**: 463. 1910.
Yellow pine, aspen, and spruce belts. Montana to Washington, California, and Utah.

9. **Arnica arcana** A. Nels. Bot. Gaz. **37**: 276. 1904.
Spruce belt. Idaho, Wyoming, and Utah.

10. **Arnica amplexicaulis** Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 408. 1841.
Arnica mollis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 187. 1871. Not *A. mollis* Hook. 1934.
Arnica amplexifolia Rydb. Mem. N. Y. Bot. Gard. **1**: 434. 1900.
Yellow pine belt. Montana to British Columbia, southward to Utah.

11. Arnica mollis Hook. Fl. Amer. **1**: 331. 1834.
Arnica subplumosa Greene, Pittonia **3**: 104. 1896.
Arnica ovata Greene, Pittonia **4**: 161. 1900.
?*Arnica macilenta* Greene, Pittonia **4**: 161. 1900.
Arnica rivularis Greene, Pittonia **4**: 163. 1900.
Yellow pine, aspen, and spruce belts. British Columbia to Utah and Nevada.

12. Arnica foliosa Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 407. 1841.
Arnica chamissonis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 187. 1871. Not *A. chamissonis* Less. 1831.
Arnica denudata Greene, Pittonia **3**: 105. 1896.
Arnica ocreata A. Nels. Bot. Gaz. **30**: 201. 1900.
Arnica tomentulosa Rydb. Bull. Torrey Club **28**: 20. 1901.
Arnica celsa A. Nels. Bot. Gaz. **31**: 408. 1901.
Arnica rhizomata A. Nels. Bot. Gaz. **31**: 409. 1901.
Yellow pine, aspen, and spruce belts. Alaska to Colorado and Utah.

12a. Arnica foliosa incana A. Gray, Bot. Calif. **1**: 416. 1876.
Arnica denudata canescens Greene, Pittonia **3**: 105. 1906.
Arnica incana Greene, Pittonia **4**: 169. 1900. Not *A. incana* Pers. 1807.
Arnica cana Greene, Ottawa Nat. **15**: 282. 1902.
Yellow pine belt. California to Utah.

13. Arnica pedunculata Rydb. Bull. Torrey Club **24**: 297. 1897.
Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to California and North Dakota.

14. Arnica fulgens Pursh, Fl. Amer. Sept. 527. 1814.
Arnica angustifolia D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 186. 1871. Not *A. angustifolia* Vahl, 1816.
Artemisia, pinyon, and yellow pine belts. British Columbia to California and South Dakota.

83. PSATHYROTES A. Gray

Leaves entire, bearing long many-celled hairs on margin and petiole; achenes hispidulous and glandular ..... **1. P. pilifera.**
Leaves crenate or dentate, without long many-celled hairs; achenes densely silky-villous.
  Plant lanate-tomentose as well as scurfy; outer phyllaries obovate, much broader than the inner ..... **2. P. ramosissima.**
  Plant scurfy-tomentose; outer phyllaries lanceolate, not broader than the inner ..... **3. P. annua.**

1. Psathyrotes pilifera A. Gray, Proc. Amer. Acad. **19**: 50. 1883.
Covillea and artemisia belts. Utah and Arizona.

2. Psathyrotes ramosissima (Torr.) A. Gray, Proc. Amer. Acad. **7**: 363 1868.
Tetradymia ramosissima Torr. in Emory, Mil. Reconn. 145. 1848.
Covillea belt. Southwestern Utah to California and Arizona.

3. Psathyrotes annua (Nutt.) A. Gray, Pl. Wright. **2**: 100. 1853.
Bulbostylis annua Nutt. Journ. Acad. Phila. n. ser. **1**: 179. 1847.
Covillea and artemisia belts. Utah to California and Arizona.

84. PEUCEPHYLLUM A. Gray

1. Peucephyllum schottii A. Gray in Torr. Rep. U. S. & Mex. Bound. Bot. 74. 1859.

Inyonia dysodioides Jones, Contr. West. Bot. **8**: 42. 1898.

Covillea belt. Nevada, California, Arizona, and Lower California.

85. TETRADYMIA DC.

Primary leaves transformed into stiff spines.
  Phyllaries 5 or 6; heads 5 to 9-flowered.
    Spines 5 to 12 mm. long, usually strongly recurved_____1. T. spinosa.
    Spines 15 to 45 mm. long, straight_____2. T. axillaris.
  Phyllaries 4; heads 4-flowered_____3. T. nuttallii.
Primary leaves not transformed into stiff spreading spines.
  Primary leaves narrowly subulate or linear-filiform, 1 mm. wide or less.
    Tomentum of stem and branches deciduous in lines; primary leaves erect, slender-subulate, softly spinescent, 15 mm. long or less; secondary leaves very numerous, fascicled, glabrate, 3 to 8 mm. long.
      4. T. glabrata.
    Tomentum of stem and branches persistent; primary leaves loosely ascending, scarcely spinescent, 2 to 3.5 cm. long; secondary leaves comparatively few, 10 to 15 mm. long.
      Flowers 6 to 9; phyllaries 5 or 6_____5. T. comosa.
      Flowers and phyllaries 4, rarely 5_____5a. T. comosa tetrameres.
  Primary leaves linear to oblanceolate, 1 to 4 mm. wide.
    Primary leaves chiefly linear, 2 to 3 cm. long, usually without fascicles in their axils_____6. T. canescens.
    Primary leaves chiefly oblanceolate, less than 2 cm. long, usually with fascicles of oblanceolate to obovate leaves in their axils.
      6a. T. canescens inermis.

1. Tetradymia spinosa Hook. & Arn. Bot. Beechey Voy. 360. 1840.

Artemisia, pinyon, and yellow pine belts. Oregon to Utah.

2. Tetradymia axillaris A. Nels. Bot. Gaz. **37**: 277. 1904.

Tetradymia spinosa longispina Jones, Proc. Calif. Acad. II. **5**: 698. 1895.

Tetradymia longispina Rydb. Bull. Torrey Club **37**: 471. 1910.

Artemisia, pinyon, and yellow pine belts. Utah and Arizona to California.

3. Tetradymia nuttallii Torr. & Gray, Fl. N. Amer. **2**: 447. 1843.

Artemisia, pinyon, and yellow pine belts. Wyoming and Utah.

4. Tetradymia glabrata A. Gray in U. S. Rep. Expl. Miss. Pacif. **2**: 122. *pl. 5.* 1854.

Artemisia belt. Idaho and Utah to Oregon and California.

5. Tetradymia comosa A. Gray, Proc. Amer. Acad. **12**: 60. 1876.

Artemisia belt. California and Nevada.

5a. Tetradymia comosa tetrameres Blake, Proc. Biol. Soc. Washington **35**: 176. 1922.

Artemisia belt. Nevada.

6. Tetradymia canescens DC. Prodr. **6**: 440. 1837.

Tetradymia linearis Rydb. Bull. Torrey Club **32**: 130. 1905.

Artemisia belt. British Columbia to California, eastward to Utah.

6a. Tetradymia canescens inermis (Nutt.) A. Gray, Bot. Calif. 1: 408. 1876.
Tetradymia inermis Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 415. 1841.
Artemisia belt, upward to the spruce belt. Montana to Utah, westward to California.

86. SENECIO L. Groundsel

Heads nodding.
Heads discoid.
Heads narrowly campanulate, 1 cm. high and thick or less__1. S. pudicus.
Heads broadly campanulate, 1.2 to 2 cm. high, 1.5 to 2 cm. thick.
2. S. accedens.
Heads radiate.
Basal and lower stem leaves elongate-lanceolate or elliptic-lanceolate, acutely dentate or denticulate; plant 15 to 60 cm. high.
3. S. amplectens.
Basal and lower stem leaves obovate or elliptic-obovate, usually obtuse, denticulate to subentire; plant 20 cm. high or less_____4. S. holmii.
Heads not nodding.
Leaves pinnatilobate, with narrowly linear or linear-filiform divisions, or narrowly linear or linear-filiform and entire; plants usually suffrutescent at base.
Leaves entire, very narrowly linear, or rarely with a pair of filiform lobes. Heads numerous, narrowly campanulate or subcylindric.
5. S. spartioides.
Leaves pinnatilobate (the upper often entire).
Plant permanently tomentose_____6. S. longilobus.
Plant glabrous or essentially so.
Calyculate bractlets of involucre half as long as the phyllaries or more.
7. S. monoensis.
Calyculate bractlets of involucre minute_____8. S. multicapitatus.
Leaves neither pinnatilobate with linear-filiform or narrowly linear divisions, nor very narrowly linear and entire; plants herbaceous (suffrutescent at base in Nos. 9 and 10).
Stem equally leafy throughout, the leaves of essentially the same shape.
Plant tomentose, at least when young; leaves deeply pinnatifid, with numerous lobes.
Stem and lower surface of leaves persistently tomentose.
15. S. fendleri.
Stem and leaves glabrate or glabrescent_____20. S. uintahensis.
Plant not tomentose; leaves entire to serrate, rarely pinnatifid.
Heads solitary or very few at tips of stem and branches.
Plant procumbent, low, 15 cm. high or less; leaves obovate, 2.5 cm. long or less, all except the uppermost narrowed into a petioliform, not clasping base_____9. S. fremontii.
Plant 20 to 50 cm. high, erect or nearly so; leaves chiefly oblong-obovate or oval, 2 to 5 cm. long, mostly sessile and clasping.
10. S. blitoides.
Heads numerous, cymose-panicled.
Leaves laciniate-lobed or pinnatifid.
Involucre 5 to 7 mm. high, the phyllaries with conspicuous black tips_____11. S. ambrosioides.
Involucre 8 to 10 mm. high, the phyllaries obscurely if at all black-tipped_____12. S. eremophilus kingii.

Leaves entire to dentate.
Leaf blades triangular, abruptly contracted into the petiole, 6 to 20 cm. long, repand-dentate or denticulate--13. S. triangularis.
Leaf blades lanceolate or elliptic, tapering to the base, the petiole obscure or none.
Leaves closely serrulate or serrate----------14. S. serra.
Leaves entire or subentire----------14a. S. serra integriusculus.
Stem not equally leafy throughout, the upper leaves conspicuously smaller than the lower, often of different shape.
Basal leaves all pinnatifid, with toothed or lobed divisions.
Plant permanently tomentose----------15. S. fendleri.
Plant glabrate or glabrescent.
Achenes rather densely hirtellous.
Stem very leafy, 40 to 50 cm high; lobes of the lowest leaves 6 to 10 mm. wide.----------16. S. lapidum.
Stem not very leafy, 30 cm. high or less; lobes of the lowest leaves 4 mm. wide or less----------17. S. multilobatus.
Achenes glabrous or very slightly hirtellous.
Rays wanting; phyllaries 13----------18. S. leucoreus.
Rays present; phyllaries usually 21.
Lower leaves subbipinnate or deeply pinnatisect into numerous small divisions----------19. S. lynceus.
Lower leaves less deeply divided.
Leaves thick and somewhat fleshy, tomentulose when young. 20. S. uintahensis.
Leaves thin, glabrous except in the axils----21. S. stygius.
Basal leaves entire to toothed or irregularly lobed, not pinnatifid.
Stems slender and low (less than 30 cm. high) or, if rarely taller, the stem leaves pinnatifid.
Plant tomentose, rarely silky, sometimes glabrescent in age.
Plant sericeous-pubescent with subappressed hairs. 22. S. convallium.
Plant tomentose-pubescent with loose hairs.
Plant glabrescent, at least as to the leaves.
Leaves rotund or spatulate-obovate, nearly or quite as broad as long----------23. S. saxosus toiyabensis.
Leaves linear-spatulate to elliptic-oblanceolate, much longer than broad----------24. S. werneriaefolius.
Plant permanently tomentose.
Basal leaves ovate to obovate.
Basal leaves entire to dentate; upper stem leaves entire to dentate, lance-linear----------25. S. oreopolus.
Basal leaves crenate-dentate to sharply serrate; stem leaves oblanceolate, often semiamplexicaul, dentate to laciniate-pinnatifid----------26. S. leonardi.
Basal leaves oblong-oblanceolate to narrowly oblanceolate.
Heads radiate----------27. S. purshianus.
Heads discoid----------27a. S. purshianus eradiatus.
Plant glabrous or essentially so from the first, rarely somewhat tomentose at base of stem and petioles.
Basal leaves rotund-ovate or ovate, conspicuously cordate.
Basal leaf blades 1 to 2.5 cm. long and wide, coarsely crenate to subentire----------28. S. pammelii.

Basal leaf blades usually 3 to 9 cm. long, closely crenate-serrate or crenate----------29. S. aureus.
Basal leaves oblanceolate to obovate or rotund, cuneate to subtruncate at base.
Basal leaves chiefly oblanceolate, entire or dentate chiefly toward apex.
Stems 10 to 30 cm. high; involucre 6 to 8 mm. high; achenes usually hirtellous----------30. S. tridenticulatus.
Stems less than 10 cm. high; involucre 4 to 5 mm. high; achenes glabrous----------31. S. wardii.
Basal leaves chiefly oblong to obovate, oval, or rotund.
Rays orange-red or saffron----------32. S. crocatus.
Rays yellow or wanting.
Leaves thin.
Basal leaves entire----------33. S. aquariensis.
Basal leaves toothed----------34. S. platylobus.
Leaves thick and somewhat fleshy.
Basal leaves suborbicular; stems usually 15 cm. high or less.
Basal leaves closely crenate throughout; heads radiate. 35. S. suksdorfii.
Basal leaves subentire; heads discoid. 36. S. malmstenii.
Basal leaves oval or obovate, entire or toothed above the base; stems taller.
Heads radiate----------37. S. cymbalarioides.
Heads discoid----------37a. S. cymbalarioides aphanactis.
Stems stout, more than 30 cm. high, the stem leaves not pinnatifid.
Plants more or less densely tomentose, at least when young.
Heads very numerous, in corymbiform panicles; phyllaries 8.
Phyllaries conspicuously black-tipped----------38. S. atratus.
Phyllaries slightly or not at all black-tipped. 38a. S. atratus milleflorus.
Heads 20 or fewer, in usually simple, corymbose or umbelliform cymes; phyllaries 13 to 21.
Achenes hispidulous.
Basal leaves mostly 10 to 25 cm. long; phyllaries black-tipped. 39. S. sphaerocephalus.
Basal leaves 2 to 12 cm. long; phyllaries yellowish green. 40. S. mutabilis.
Achenes glabrous.
Basal leaves cuneate-oblanceolate or cuneate-obovate, coarsely repand-toothed, gradually and evenly tapering to base. 41. S. scorzonella.
Basal leaves oval to obovate or oblong-elliptic, entire to denticulate, distinctly petioled----------42. S. sonnei.
Plants glabrous from the first, or merely somewhat crisp-hairy.
Heads discoid----------43. S. pacificus.
Heads radiate.
Heads very numerous, in corymbiform panicles, the pedicels mostly less than 1 cm. long----------44. S. hydrophilus.
Heads few to many, in simple corymbiform or umbelliform cymes, the pedicels more than 1 cm. long.

Terminal head on a well-developed pedicel; phyllaries strongly thickened dorsally along midline_____45. S. crassulus.
Terminal head sessile or on a pedicel much shorter than those of the lateral heads; phyllaries not thickened dorsally along midline_____46. S. integerrimus.

1. Senecio pudicus Greene, Pittonia **4**: 118. 1900.
Senecio cernuus A. Gray, Amer. Journ. Sci. II. **33**: 239. 1862. Not *S. cernuus* L. f. 1781.
Yellow pine, aspen, spruce, and subalpine belts. Colorado, New Mexico, and Utah.

2. Senecio accedens Greene, Pittonia **3**: 105. 1896.
Spruce belt. Wyoming to New Mexico and Utah.

3. Senecio amplectens A. Gray, Amer. Journ. Sci. II. **33**: 240. 1862.
Senecio seridophyllus Greene, Pittonia **4**: 121. 1900.
Spruce and alpine belts. Wyoming to New Mexico and Nevada.

4. Senecio holmii Greene, Pittonia **4**: 120. 1900.
Senecio amplectens taraxacoides D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 192. 1871. Not *S. taraxacoides* Greene, 1900.
Spruce and alpine belts. Colorado to Nevada.

5. Senecio spartioides Torr. & Gray, Fl. N. Amer. **2**: 438. 1843.
Artemisia belt upward to the aspen belt. Nebraska to Wyoming, southward to Texas and Arizona.

6. Senecio longilobus Benth. Pl. Hartw. 18. 1839.
Senecio filifolius Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 414. 1841. Not *S. filifolius* Berg. 1767.
Covillea, artemisia, pinyon, and yellow pine belts. Colorado and Utah to Arizona and Mexico.

7. Senecio monoensis Greene, Leaflets **1**: 221. 1906.
Senecio lathyroides Greene, Leaflets **2**: 21. 1909.
Senecio filicifolius Greenm. Ann. Mo. Bot. Gard. **1**: 274, 1914.
Covillea and artemisia belts. Utah to California and Mexico.

8. Senecio multicapitatus Greenm.; Rydb. Bull. Torrey Club **33**: 160. 1906.
Yellow pine, aspen, spruce, and subalpine belts. Colorado, Utah, New Mexico, and Arizona.

9. Senecio fremontii Torr. & Gray, Fl. N. Amer. **2**: 445. 1843.
Spruce and alpine belts. Montana to Oregon, Nevada, and Utah.

10. Senecio blitoides Greene, Pittonia **4**: 123. 1900.
Senecio invenustus Greene, Pittonia **4**: 124. 1900.
Alpine belt. Wyoming, Colorado, and Utah.

11. Senecio ambrosioides Rydb. Bull. Torrey Club **37**: 467. 1910.
Spruce and subalpine belts. Wyoming to New Mexico and Utah.

12. Senecio eremophilus kingii (Rydb.) Greenm. Ann. Mo. Bot. Gard. **2**: 598. 1915.
Senecio eremophilus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 191. 1871. Not *S. eremophilus* Richards. 1823.
Senecio kingii Rydb. Bull. Torrey Club **37**: 468. 1910.
Yellow pine, aspen, and spruce belts. Utah.

13. Senecio triangularis Hook. Fl. Bor. Amer. **1**: 332. *pl. 115*. 1834.
Senecio trigonophyllus Greene, Pittonia **3**: 106. 1896.
Yellow pine, aspen, spruce, and subalpine belts. Saskatchewan to New Mexico and California.

14. Senecio serra Hook. Fl. Bor. Amer. 1: 333. 1834.
Artemisia belt, upward to the spruce belt. Montana to Washington, California, and Utah.

14a. Senecio serra integriusculus A. Gray. Syn. Fl. 1²: 387. 1884.
Senecio andinus Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 409, 1841. Not *S. andinus* Buek. 1840.
Senecio lanceolatus Torr. & Gray, Fl. N. Amer. 2: 440. 1843.
Yellow pine belt. Wyoming, Utah, and Nevada.

15. Senecio fendleri A. Gray, Mem. Amer. Acad, n. ser. 4: 108. 1849.
Yellow pine, aspen, spruce, and subalpine belts. Utah (according to Rydberg), Colorado, New Mexico, and Utah.

16. Senecio lapidum Greenm. Ann. Mo. Bot. Gard. 4: 18. 1917.
Artemisia belt. Utah.

17. Senecio multilobatus Torr. & Gray; A. Gray, Mem. Amer. Acad. n. ser. 4: 109. 1849.
Artemisia, pinyon, and yellow pine belts. Wyoming, Utah, and Nevada.

18. Senecio leucoreus Greenm. Ann. Mo. Bot. Gard. 4: 21. 1917.
Pinyon and yellow pine belts. Nevada.

19. Senecio lynceus Greene, Erythea 3: 22. 1895.
Artemisia belt(?). Arizona, Nevada, and Utah.

20. Senecio uintahensis (A. Nels.) Greenm. Monogr. Senecio 1: 24. 1901.
Senecio nelsonii uintahensis A. Nels. Bull. Torrey Club 26: 484. 1899.
Senecio utahensis A. Nels. Spring Fl. Intermount. States 175. 1912.
Yellow pine, aspen, and spruce belts. Wyoming to Oregon, California, and Arizona.

21. Senecio stygius Greene, Leaflets 2: 21. 1909.
Senecio prolixus Greenm. Ann. Mo. Bot. Gard. 1: 264. 1914.
Covillea belt. California, Arizona, and Nevada.

22. Senecio convallium Greenm. Ann. Mo. Bot. Gard. 1: 266. 1914.
Rabbit Valley, Utah.

23. Senecio saxosus toiyabensis Greenm. Ann. Mo. Bot. Gard. 5: 60. 1918.
Yellow pine, aspen, spruce, and subalpine belts. Idaho and Nevada.

24. Senecio werneriaefolius A. Gray, Proc. Amer. Acad. 19: 54. 1883.
Spruce and subalpine belts. South Dakota and Wyoming to Utah and Arizona.

25. Senecio oreopolus Greenm. Ann. Mo. Bot. Gard. 1: 267. *pl. 11.* 1914.
Spruce and subalpine belts. California and western Nevada.

26. Senecio leonardi Rydb. Bull. Torrey Club 37: 468. 1910.
Senecio aureus obovatus D. C. Eaton in King, Geol. Expl. 40th Par. 5: 190. 1871, in part. Not *S. obovatus* Muhl. 1804.
Artemisia belt. British Columbia to Utah and Nevada.

27. Senecio pursh ianus Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 412. 1841.
Senecio canus D. C. Eaton in King, Geol. Expl. 40th Par. 5: 190. 1871.
Not *S. canus* Hook. 1834.
Senecio howellii Greene, Bull. Torrey Club 8: 98. 1881.
Artemisia belt, upward to the spruce belt, South Dakota to Washington, southward to Nevada and California.

27a. Senecio purshianus eradiatus (D. C. Eaton) Blake.

Senecio canus eradiatus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 190. 1871.

Senecio howellii eradiatus Greenm. Ann. Mo. Bot. Gard. **5**: 87. 1918.

Spruce and subalpine belts. East Humboldt Mountains, Nevada.

28. Senecio pammelii Greenm. Ann. Mo. Bot. Gard. **3**: 118. 1916.

Spruce belt. Utah and Nevada.

29. Senecio aureus L. Sp. Pl. 870. 1753.

Senecio pseudaureus Rydb. Bull. Torrey Club **24**: 298. 1897.

Yellow pine, aspen, spruce, and alpine belts. Labrador to British Columbia, California, and Georgia.

30. Senecio tridenticulatus Rydb. Bull. Torrey Club **27**: 175. *pl. 5, f. 12.* 1900.

Senecio oblanceolatus Rydb. Bull. Torrey Club **27**: 175. *pl. 5, f. 9.* 1900.

Artemisia, pinyon, and yellow pine belts. Manitoba to Texas and Nevada.

31. Senecio wardii Greene, Pittonia **4**: 116. 1900.

Spruce belt. Utah.

32. Senecio crocatus Rydb. Bull. Torrey Club **24**: 299. 1897.

Senecio aureus croceus A. Gray, Proc. Acad. Phila. **15**: 68. 1863.

Senecio pyrrochrous Greene, Pl. Baker. **3**: 24. 1901.

Senecio tracyi Rydb. Bull. Torrey Club **33**: 159. 1906.

Spruce and alpine belts. Colorado and Utah.

33. Senecio aquariensis Greenm. Ann. Mo. Bot. Gard. **3**: 144. 1916.

Spruce belt. Utah.

34. Senecio platylobus Rydb. Bull. Torrey Club **27**: 181. *pl. 6, f. 8.* 1900.

Artemisia, pinyon, yellow pine, and aspen belts. Utah.

35. Senecio suksdorfii Greenm. Bot. Gaz. **53**: 511. 1912.

Aspen, spruce, and subalpine belts. Washington to California and Nevada.

36. Senecio malmstenii Blake, Proc. Biol. Soc. Washington **36**: 183. 1923.

Yellow pine belt; Sevier National Forest, Utah.

37. Senecio cymbalarioides Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 412. 1841.

Senecio aureus obovatus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 190. 1871, in part. Not *S. obovatus* Muhl. 1804.

Senecio aureus croceus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 190. 1871, in part. Not *S. aureus croceus* A. Gray, 1863.

Senecio aureus borealis Torr. & Gray, Fl. N. Amer. **2**: 442. 1843.

Senecio laetiflorus Greene, Pittonia **3**: 88. 1896.

Senecio rubricaulis Greene, Pittonia **3**: 89. 1896.

Senecio jonesii Rydb. Bull. Torrey Club **27**: 179. *pl. 5, f. 5.* 1900.

Senecio cymbalarioides borealis Greenm. Ann. Mo. Bot. Gard. **3**: 177. 1916.

Spruce and alpine belts. Alberta to Washington, Nevada and New Mexico.

37a. Senecio cymbalarioides aphanactis (Greenm.) Blake.

Senecio rubricaulis aphanactis Greenm. Ann. Mo. Bot. Gard. **3**: 174. 1916.

Artemisia belt. Utah.

38. Senecio atratus Greene, Pittonia **3**: 105. 1896.

Senecio lugens exaltatus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 188. 1871, in part. Not *S. exaltatus* Nutt. 1841.

Senecio lugens foliosus A. Gray in Brewer & Wats. Bot. Calif. **1**: 413. 1876.

? *Senecio foliosus* Rydb. Fl. Rocky Mount. 991. 1917. Not *S. foliosus* Salzm. 1837.

Yellow pine, aspen, spruce, and subalpine belts. Colorado, New Mexico, and Utah.

38a. Senecio atratus milleflorus (Greene) Greenm. Ann. Mo. Bot. Gard. **5**: 100. 1918.

Senecio lugens exaltatus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 188. 1871, in part.

Senecio milleflorus Greene, Pittonia **4**: 116. 1900.

Spruce belt. Colorado and Utah.

39. Senecio sphaerocephalus Greene, Pittonia **3**: 106. 1896.

Senecio altus Rydb. Mem. N. Y. Bot. Gard. **1**: 443. 1900.

Spruce and subalpine belts. Montana to Utah and Nevada.

40. Senecio mutabilis Greene, Pittonia **4**: 113. 1900.

Senecio cognatus Greene, Pittonia **4**: 114. 1900.

Senecio aurellus Rydb. Bull. Torrey Club **27**: 182. *pl. 6*. 1900.

Yellow pine, aspen, and spruce belts. Colorado, Arizona, and Utah.

41. Senecio scorzonella Greene, Pittonia **3**: 90. 1896.

Yellow pine, aspen, and spruce belts. California and Nevada.

42. Senecio sonnei Greene, Fl. Franc. 467. 1897.

Yellow pine belt. California to Utah.

43. Senecio pacificus (Greene) Rydb. Fl. Rocky Mount. 998, 1068. 1917.

Senecio hydrophilus pacificus Greene, Pittonia **1**: 220. 1888.

Yellow pine belt. Idaho and Washington to California and Nevada.

44. Senecio hydrophilus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 411. 1841.

Artemisia, pinyon, and yellow pine belts. South Dakota to British Columbia, southward to Utah and California.

45. Senecio crassulus A. Gray, Proc. Amer. Acad. **19**: 54. 1883.

Senecio semiplexicaulis Rydb. Mem. N. Y. Bot. Gard. **1**: 440. 1900.

Senecio semiamplexicaulis Rydb. Colo. Exp. Sta. Bull. **100**: 395. 1906.

Yellow pine, aspen, spruce, and alpine belts. South Dakota to Idaho, southward to New Mexico and Utah.

46. Senecio integerrimus Nutt. Gen. Pl. **2**: 165. 1818.

Senecio lugens Richards. Bot. App. Frankl. Journ. 31. 1823.

Senecio exaltatus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 410. 1841.

Senecio lugens hookeri D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 188. 1871.

Senecio lugens parryi D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 188. 1871.

Senecio perplexus A. Nels. Bull. Torrey Club **27**: 271. 1900.

Senecio dispar A. Nels. Bull. Torrey Club **27**: 272. 1900.

Artemisia, pinyon, and yellow pine belts. Minnesota to British Columbia, California, and Colorado.

87. ARCTIUM L. Burdock

1. Arctium minus (Hill) Bernh. Syst. Verz. Pflanz. 154. 1800.

Lappa minor Hill, Veg. Syst. **4**: 28. 1762.

Waste places; introduced from Europe. Nova Scotia to Georgia, British Columbia, and Nevada.

88. CIRSIUM Hill. Thistle

Phyllaries densely arachnoid-pubescent or arachnoid-tomentose.

Middle phyllaries squarrose, the outermost reflexed.

Flowers bright crimson. Whole plant very densely arachnoid-tomentose.

1. C. occidentale candidissimum.

Flowers white, pink, or pale purplish.
Involucre 2.5 to 3 cm. high, its spines stout, 6 to 15 mm. long; leaves white-tomentose both sides----------2. C. neomexicanum.
Involucre 1.5 to 2 cm. high, its spines slender, 3 to 9 mm. long; leaves greenish above----------3. C. utahense.
Middle phyllaries usually appressed, the outermost not reflexed.
Inner phyllaries with conspicuously dilated lacerate scarious tips.
4. C. parryi.
Inner phyllaries not with dilated scarious tips.
Stem winged by the decurrent leaf bases; middle phyllaries usually spreading. Flowers rosy purple----------6. C. lanceolatum.
Stem not winged, the leaves slightly or not at all decurrent or, if decurrent (*C. scopulorum*), the flowers ochroleucous; middle phyllaries usually erect.
Corolla lobes almost filiform, capitellate-thickened at apex.
7. C. edule.
Corolla lobes linear, obtuse, not thickened at apex.
Phyllaries all with slender stiff yellowish prickles 3 to 5 mm. long.
8. C. scopulorum.
Only the outer phyllaries armed with prickles----------9. C. hallii.
Phyllaries not densely arachnoid or tomentose, either glabrous or somewhat arachnoid or tomentose on margin.
Outer phyllaries spinulose-ciliate.
Leaves crisp, very spiny; phyllaries very spiny, subequal----10. C. eatoni.
Leaves flattish, weakly spiny; outer phyllaries shorter, weakly spiny.
11. C. clavatum.
Outer phyllaries not spinulose-ciliate.
Outer or middle phyllaries not with a conspicuous glutinous dorsal ridge.
Inner phyllaries with elongate, attenuate, plane, often reddish tips.
Leaves glabrous or glabrate on both sides.
Spines of the middle phyllaries about 1 cm long, exceeding the body of the phyllaries----------12. C. rothrockii.
Spines of the middle phyllaries 3 to 7 mm. long, shorter than the body of the phyllaries.
Stem glabrous; leaves scarcely decurrent, with rounded clasping base and few broad lobes (these 2 to 3.5 cm. wide); outer phyllaries wide-spreading or deflexed----------20. C. rydbergii.
Stem floccose-tomentulose at least when young; leaves usually strongly decurrent, not with rounded clasping base, their lobes 2 cm. wide or usually less; outer phyllaries appressed or ascending.
Middle leaves strongly decurrent, winging the stem.
13. C. calcareum.
Middle leaves slightly or not at all decurrent.
14. C. bipinnatum.
Leaves persistently tomentose beneath.
Middle phyllaries with stout yellowish spines 7 to 10 mm. long.
15. C. nidulum.
Middle phyllaries with slender shorter spines.
Flowers bright crimson----------16. C. arizonicum.
Flowers purple, pink, or ochroleucous.
Involucre comparatively narrow, turbinate or campanulate, 2.5 cm. thick or less; heads usually several at tips of branches, on short bracted pedicels----------17. C. pulchellum.

Involucre broad, subglobose. 3 to 6 cm. thick; heads on long nearly naked peduncles----------18. C. andersonii.

Inner phyllaries with usually dilated and twisted often erose tips.

Phyllaries all, except the outermost, with dilated fimbriate tips. 5. C. centaureae.

Phyllaries not, or only the innermost, with dilated fimbriate tips.

Leaves deeply and regularly pinnatifid into narrow divisions 5 to 10 mm. wide, permanently and densely white-tomentose beneath----------19. C. scariosum.

Leaves usually irregularly pinnatifid or lobed, if regularly and narrowly pinnatifid not densely tomentose beneath.

Stem and leaves glabrous and glaucous; leaves with broad lobes and broadly rounded basal auricles----------20. C. rydbergii.

Stem and leaves more or less pubescent, at least when young, not glaucous; leaves not with broad rounded basal auricles.

Plant leafy-stemmed, 10 to 40 cm. high----21. C. drummondii.

Plant acaulescent, the heads sessile and clustered on the crown. 21a. C. drummondii acaulescens.

Outer or middle phyllaries with a conspicuous glutinous dorsal ridge.

Phyllaries only in part (outer ones) spine-tipped, the spines weak, 1 mm. long or less. Stem essentially glabrous----------27. C. arvense.

Phyllaries all, except sometimes the inmost, tipped with firm spines 3 to 10 mm. long.

Plant slightly arachnoid-tomentose, glabrescent; middle leaves very strongly decurrent, forming broad wings on the stem. 13. C. calcareum.

Plant more or less persistently tomentose; middle leaves usually not decurrent, never forming broad wings on the stem.

Heads numerous, comparatively small, the larger only 2 to 3 cm. high.

Anther tips triangular, acuminate; throat of corolla longer than the lobes; plant densely and persistently white-tomentose on stem and both sides of leaves; phyllaries ovate. 22. C. breweri.

Anthers rather abruptly subulate-tipped; throat of corolla equaling or shorter than the lobes; plants less densely tomentose; phyllaries lanceolate.

Leaves greenish, slightly floccose both sides or glabrate above; flowers straw-colored----------23. C. canovirens.

Leaves persistently tomentose; flowers rosy, purple, or rarely white----------24. C. canescens.

Heads solitary or few, large, 3 to 5 cm. high.

Heads smaller, the involucre rarely 4 cm. thick; spines of the phyllaries 5 mm. long or less; leaves usually persistently tomentose above, slightly decurrent----------25. C. undulatum.

Heads very large, the involucre 4 cm. thick or more; spines of the phyllaries about 1 cm. long; leaves greenish above, conspicuously decurrent----------26. C. ochrocentrum.

1. Cirsium occidentale candidissimum (Greene) Petrak, Bot. Tidsskr. **31**: 67. 1911.

Cirsium coulteri D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 195. 1871. Not *C. coulteri* Harv. & Gray, 1849.

Carduus candidissimus Greene, Proc. Acad. Phila. **1892**: 359. 1893.

Artemisia and yellow pine belts. California and Nevada.

2. Cirsium neomexicanum A. Gray, Pl. Wright. **2:** 101. 1853.
Cnicus neomexicanus A. Gray, Proc. Acad. Amer. **10:** 45. 1874.
Artemisia belt. Colorado and New Mexico, westward to Nevada.

3. Cirsium utahense Petrak, Beih. Bot. Centralbl. **35²:** 470. Oct. 1917.
Cirsium foliosum D. C. Eaton in King, Geol. Expl. 40th Par. **5:** 194. 1871 Not *C. foliosum* DC. 1837.
Carduus nevadensis Greene, Pittonia **3:** 26. 1896.
Cirsium nevadense Petrak, Beih. Bot. Centralbl. **35²:** 552. 1917. Not *C. nevadense* Willk. 1859.
Cirsium humboldtense Rydb. Fl. Rocky Mount. 1007, 1068. Dec. 1917.
Artemisia belt. Utah, Nevada, and northwestern Arizona.

4. Cirsium parryi (A. Gray) Petrak, Bot. Tidsskr. **31:** 68. 1911.
Cnicus parryi A. Gray, Proc. Amer. Acad. **10:** 47. 1874.
Yellow pine, aspen, spruce, and subalpine belts. Colorado, Arizona, and New Mexico.

5. Cirsium centaureae (Rydb.) Schum. Just's Bot. Jahresb. **29¹:** 566. 1903.
Cnicus carlinoides americanus A. Gray, Proc. Amer. Acad. **10:** 48. 1874.
Cnicus americanus A. Gray, Proc. Amer. Acad. **19:** 56. 1883.
Carduus centaureae Rydb. Bull. Torrey Club **28:** 607. 1901.
Cirsium americanum Daniels, Fl. Boulder, Colo. 253. 1911. Not *C. americanum* Schum. 1903.
Yellow pine, aspen, and spruce belts. Wyoming, Colorado, and "Utah."

6. Cirsium lanceolatum (L.) Hill, Herb. Brit. **1:** 80. 1769.
Carduus lanceolatus L. Sp. Pl. 821. 1753.
Waste places; introduced from Europe. Nova Scotia to Georgia, westward to British Columbia and California.

7. Cirsium edule Nutt. Trans. Amer. Phil. Soc. n. ser. **7:** 420. 1841.
Cnicus edulis A. Gray, Proc. Amer. Acad. **10:** 47. '1874.
Artemisia, pinyon, and yellow pine belts. Montana to British Columbia, California, and Nevada.

8. Cirsium scopulorum (Greene) Cockerell; Daniels, Fl. Boulder, Colo. 253. 1911.
Cirsium eriocephalum A. Gray, Proc. Acad. Phila. **1863:** 69. 1864. Not *C. eriocephalum* Wallr. 1840.
Cnicus eriocephalus A. Gray, Proc. Amer. Acad. **10:** 46. 1874.
Carduus scopulorum Greene, Proc. Acad. Phila. **1892:** 362. 1893.
Yellow pine, aspen, spruce, and subalpine belts. Wyoming, Colorado, Utah, and Nevada (?).

9. Cirsium hallii (A. Gray) Jones, Bull. Univ. Mont. Biol. Ser. **15:** 47. 1910.
Cnicus hallii A. Gray, Proc. Amer. Acad. **19:** 56. 1883.
Artemisia, pinyon, and yellow pine belts. Oregon, California, and Utah.

10. Cirsium eatoni (A. Gray) Robinson, Rhodora **13:** 240. 1911.
Cirsium eriocephalum leiocephalum D. C. Eaton in King, Geol. Expl. 40th Par. **5:** 196. 1871.
Cnicus eatoni A. Gray, Proc. Amer. Acad. **19:** 56. 1883.
Spruce and subalpine belts. Colorado and Utah to Idaho and Nevada.

11. Cirsium clavatum (Jones) Petrak, Beih. Bot. Centralbl. **35²:** 310. 1917.
Cnicus clavatus Jones, Proc. Calif. Acad. II. **5:** 704. 1895.
Subalpine belt. Utah.

12. **Cirsium rothrockii** (A. Gray) Petrak, Bot. Tidsskr. **31**: 68. 1911.
Cnicus rothrockii A. Gray, Proc. Amer. Acad. **17**: 220. 1882.
Cnicus rothrockii diffusus Eastw. Proc. Calif. Acad. II. **6**: 303. 1896.
Cnicus diffusus Eastw. Proc. Calif. Acad. III. **1**: 121. 1898.
Cirsium pulchellum diffusum Petrak, Beih. Bot. Centralbl. **35**²: 513. 1917.
Cirsium diffusum Rydb. Fl. Rocky Mount. 1010, 1068. 1917.
Yellow pine belt (?). Utah and Arizona.

13. **Cirsium calcareum** (Jones) Woot. & Standl. Contr. U. S. Nat. Herb. **19**: 752. 1915.
Cnicus calcareus Jones, Proc. Calif. Acad. II. **5**: 704. 1895.
Yellow pine, aspen, and spruce belts. Utah.

14. **Cirsium bipinnatum** (Eastw.) Petrak, Beih. Bot. Centralbl. **35**²: 514. 1917.
Cnicus drummondii bipinnatus Eastw. Zoe **4**: 8. 1893.
Cirsium pulchellum glabrescens Petrak, Beih. Bot. Centralbl. **35**²: 511. 1917.
Artemisia and pinyon belts. Colorado, New Mexico, and Utah.

15. **Cirsium nidulum** (Jones) Petrak, Beih. Bot. Centralbl. **35**²: 553. 1917.
Cnicus nidulus Jones, Proc. Calif. Acad. II. **5**: 705. 1895.
Artemisia belt. Utah and Arizona.

16. **Cirsium arizonicum** (A. Gray) Petrak, Bot. Tidsskr. **31**: 68. 1911.
Cnicus arizonicus A. Gray, Proc. Amer. Acad. **10**: 44. 1874.
Covillea, artemisia, pinyon, and yellow pine belts. Utah and Arizona.

17. **Cirsium pulchellum** (Greene) Woot. & Standl. Contr. U. S. Nat. Herb. **19**: 752. 1915.
Carduus pulchellus Greene; Rydb. Colo. Agr. Exp. Stat. Bull. **100**: 401. 1906.
Artemisia, pinyon, and yellow pine belts. Colorado, Utah, and New Mexico.

18. **Cirsium andersonii** (A. Gray) Petrak. Bot. Tidsskr. **31**: 68. 1911.
Cnicus andersonii A. Gray, Proc. Amer. Acad. **10**: 44. 1874.
Yellow pine, aspen, and spruce belts. Idaho to California and Nevada.

19. **Cirsium scariosum** Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 420. 1841.
Carduus laccerus Rydb. Bull. Torrey Club **37**: 543. 1910.
?Carduus olivescens Rydb. Bull. Torrey Club **37**: 544. 1910.
?Cirsium olivescens Petrak, Beih. Bot. Centralbl. **35**²: 307. 1917.
Cirsium lacerum Petrak, Beih, Bot. Centralbl. **35**²: 548. 1917.
Cirsium foliosum DC.; Rydb. Fl. Rocky Mount. 1010, 1917, at least as to our range.
Artemisia belt, upward to the spruce belt. Montana to Utah.

20. **Cirsium rydbergii** Petrak, Beih. Bot. Centralbl. **35**²: 315. Oct. 1917.
Cirsium lactucinum Rydb. Fl. Rocky Mount. 1010, 1068. Dec. 1917.
Artemisia belt; San Juan River, Utah.

21. **Cirsium drummondii** Torr. & Gray, Fl. N. Amer. **2**: 459. 1843.
Cnicus drummondii A. Gray, Proc. Amer. Acad. **10**: 40. 1874.
?Carduus oreophilus Rydb. Bull. Torrey Club **28**: 509. 1901.
Carduus coloradensis Rydb. Bull. Torrey Club **32**: 132. 1905.
Cirsium coloradense Cockerell; Daniels, Fl. Boulder, Colo. 254. 1911.
?Cirsium oreophilum Rydb. Fl. Rocky Mount. 1009, 1068. 1917.
Yellow pine, aspen, and spruce belts. Saskatchewan to British Columbia, southward to Utah and California.

21a. **Cirsium drummondii acaulescens** (A. Gray) Macbr. Contr. Gray Herb. n. ser. **53**: 22. 1918.
Cnicus drummondii acaulescens A. Gray, Proc. Amer. Acad. **10**: 40. 1874.
Cirsium acaulescens Schum. Just's Bot. Jahresh. **29**¹: 566. 1903.

Cirsium coloradense acaulescens Petrak, Beih. Bot. Centralbl. **35**²: 370. 1917.
Yellow pine, aspen, and spruce belts. Colorado to Nevada and New Mexico.

22. Cirsium breweri (A. Gray) Jepson, Fl. West. Mid. Calif. 507. 1901.
Cnicus breweri A. Gray, Proc. Amer. Acad. **10**: 43. 1874.
Cirsium breweri lanosissimum Petrak, Beih. Bot. Centralbl. **35**²: 462. 1917.
Yellow pine and aspen belts. Nevada and California.

23. Cirsium canovirens (Rydb.) Petrak, Beih. Bot. Centralbl. **35**²: 540. 1917.
Carduus canovirens Rydb. Mem. N. Y. Bot. Gard. **1**: 450. 1900.
Yellow pine belt. Montana, Wyoming, and Utah.

24. Cirsium canescens Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 420. 1841.
Cnicus undulatus canescens A. Gray, Proc. Amer. Acad. **10**: 42. 1874.
Artemisia, pinyon, and yellow pine belts. Wyoming to Utah and New Mexico.

25. Cirsium undulatum (Nutt.) Spreng. Syst. Veg. **3**: 374. 1826.
Carduus undulatus Nutt. Gen. Pl. **2**: 130. 1818.
Cirsium undulatum albescens D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 194. 1871.
Cnicus undulatus A. Gray, Proc. Amer. Acad. **10**: 42. 1874.
Cnicus nelsoni Pammel, Proc. Ia. Acad. Sci. **8**: 235. 1901.
?*Carduus oblanceolatus* Rydb. Bull. Torrey Club **28**: 510. 1901.
?*Cirsium oblanceolatum* Schum. Just's Bot. Jahresb. **29**¹: 566. 1903.
Carduus tracyi Rydb. Bull. Torrey Club **32**: 133. 1905.
Cirsium tracyi Petrak, Beih. Bot. Centralbl. **35**²: 424. 1917.
Cirsium nelsoni Petrak, Beih. Bot. Centralbl. **35**²: 552. 1917.
Artemisia, pinyon, and yellow pine belts. Michigan to Texas, Arizona and British Columbia.

26. Cirsium ochrocentrum A. Gray, Mem. Amer. Acad. n. ser. **4**: 110. 1849.
Cnicus ochrocentrus A. Gray, Proc. Amer. Acad. **19**: 57. 1883.
Covillea, artemisia, pinyon, and yellow pine belts. Nebraska to Texas and Arizona.

27. Cirsium arvense (L.) Scop. Fl. Carn. ed. 2. **2**: 126. 1772. CANADA THISTLE.
Serratula arvensis L. Sp. Pl. 820 1753.
Waste places; "Utah." Introduced from Europe. Newfoundland to British Columbia, Utah, and Virginia.

89. ONOPORDON L. COTTONTHISTLE

1. Onopordon acanthium L. Sp. Pl. 827. 1753.
Introduced from Europe. Eastern United States to Utah.

90. CENTAUREA L. CENTAUREA

Phyllaries bearing 3 to 5 spines at apex, the central one much the largest; flowers yellow; plants annual; stem winged.
Central spine of phyllaries yellowish, stout, 1.2 to 2 cm. long; plant persistently tomentose ..... 1. C. solstitialis.
Central spine more or less purplish-tinged, slender, 0.8 to 1 cm. long; plant hispidulous ..... 2. C. melitensis.
Phyllaries with broad, entire or subentire, whitish, scarious tips; flowers rosy; plant perennial; stem wingless ..... 3. C. picris.

1. Centaurea solstitialis L. Sp. Pl. 917. 1753.
Introduced from Europe; "Utah." Massachusetts to California.

2. Centaurea melitensis L. Sp. Pl. 917. 1753.

Arden, Nevada, near watering trough; introduced from Europe. Georgia to California and Oregon.

3. Centaurea picris Pall.; Willd. Sp. Pl. 3: 2302. 1803.

Vicinity of Salt Lake City, Utah; introduced from the Caucasus. A scattered weed in the United States.

91. HECASTOCLEIS A. Gray

1. Hecastocleis shockleyi A. Gray, Proc. Amer. Acad. 17: 221. 1882.

Artemisia belt; vicinity of Candelaria, Esmeralda County, Nevada.

92. ATRICHOSERIS A. Gray

1. Atrichoseris platyphylla A. Gray, Syn. Fl. 1[2]: 410. 1884.

Malacothrix platyphylla A. Gray, Proc. Amer. Acad. 9: 214. 1874.

Gravelly desert areas of the Covillea belt. Southwestern Utah to southern California and Arizona.

93. MICROSERIS D. Don

Pappus of plumose bristles.

Involucre 10 to 15 mm. high ..... 1. M. nutans.

Involucre 15 to 20 mm. high ..... 1a. M. nutans major.

Pappus not of plumose bristles.

Pappus of 5 linear-lanceolate paleae, bifid at tip, the midrib excurrent as an awn; leaves very narrowly linear and entire or deeply pinnatifid, somewhat pubescent at least when young; phyllaries very unequal. 2. M. linearifolia.

Pappus of about 20 very narrowly linear-lanceolate, attenuate paleae; leaves narrowly linear-lanceolate, entire, tomentulose-ciliolate on margin; phyllaries equal or subequal ..... 3. M. troximoides.

1. Microseris nutans (Geyer) Schultz Bip. Pollichia 22–24: 309. 1866.

Scorzonella nutans Geyer; Hook. Lond. Journ. Bot. 6: 253. 1847.

Calais nutans A. Gray in U. S. Rep. Expl. Miss. Pacif. 4: 113. 1857.

Calais nutans latifolia D. C. Eaton in King. Geol. Expl. 40th Par. 5: 197. 1871.

Ptilocalais nutans Greene, Bull. Calif. Acad. 2: 54. 1886.

?Ptilocalais tenuifolia Osterhout, Muhlenbergia 1: 142. 1906.

Ptilocalais graciloba A. Gray; Rydb. Fl. Rocky Mount. 1017, at least as to our range. 1917.

Canyons and mountain meadows of the artemisia belt, upward to 3,000 meters. Montana and British Columbia to Utah and California.

1a. Microseris nutans major (A. Gray) Nels. & Macbr. Bot. Gaz. 61: 47. 1916.

Ptilophora major A. Gray, Memo. Amer. Acad. n. ser. 4: 113. 1849.

Calais major A. Gray in U. S. Rep. Expl. Miss. Pacif. 4: 113. 1857.

Microseris major Schultz Bip. Pollichia 22–24: 309. 1866.

Ptilocalais major Greene, Bull. Calif. Acad. 2: 54. 1886.

Ptilocalais macrolepis Rydb. Bull. Torrey Club 38: 11. 1911.

Microseris major macrolepis Nels. & Macbr. Bot. Gaz. 61: 47. 1916.

Plains and meadows of the artemisia belt. Montana to British Columbia, California, and Utah.

2. Microseris linearifolia (DC.) Schultz Bip. Pollichia 22–24: 308. 1866.

Calais linearifolia DC. Prodr. 7: 85. 1838.

Uropappus linearifolius Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 425. 1841.

? *Calais machochaeta* D. C. Eaton in King, Geol. Expl. 40th Par. 5: 196. 1871.
Not *C. macrochaeta* A. Gray, 1849.

Microderis [sic] *nevadensis* Gandog. Bull. Soc. Bot. France 65: 52. 1918.

Plains and sandhills of the artemisia belt. Idaho and Washington to New Mexico and California.

3. **Microseris troximoides** A. Gray, Proc. Amer. Acad. 9: 211. 1874.
Nothocalais troximoides Greene, Bull. Calif. Acad. 2: 55. 1886.

Plains and hillsides of the artemisia, pinyon, and yellow pine belts. Montana to Washington, California, and Utah.

94. ANISOCOMA Torr. & Gray

1. **Anisocoma acaulis** Torr. & Gray, Journ. Bost. Soc. Nat. Hist. 5: 111. *pl. 13.* 1845.

Desert areas and hillsides of the Covillea and artemisia belts. Eastern California, Nevada, and Arizona.

95. PTILORIA Raf.

Involucre 9 to 13 mm. high, 10 to 20-flowered.
Pappus bristles essentially naked at base, plumose above; leaves subentire or with a few salient teeth ..... 1. P. lactucina.
Pappus bristles plumose to the base; leaves deeply runcinate-pinnatifid ..... 2. P. parryi.
Involucre 6 to 8 (rarely 10) mm. high, 3 to 9-flowered.
Plants perennial.
Pappus bristles plumose essentially to base.
Plant rather stout, comparatively little branched; involucre 8 to 10 mm. high ..... 3. P. tenuifolia.
Plant slender, densely and intricately branched; involucre 5 to 8 mm. high ..... 3a. P. tenuifolia myrioclada.
Pappus bristles merely hispidulous toward base, plumose above.
Plant densely tomentulose ..... 4. P. cinerea.
Plant glabrous.
Pappus bristles merely hirsutulous for about two-fifths their length from base; leaves very narrowly linear, chiefly entire. ..... 5. P. lygodesmoides.
Pappus bristles merely hirsutulous for one-quarter their length from base, or less; leaves, at least the lower, lanceolate and runcinate-pinnatifid ..... 6. P. pauciflora.
Plants annual or biennial.
Pappus bristles plumose nearly or quite to base.
Pappus brownish, its bristles slightly paleaceous-dilated at base; heads panicled ..... 7. P. paniculata.
Pappus white, its bristles not dilated at base; heads in long spiciform or somewhat thyrsoid panicles ..... 8. P. virgata.
Pappus bristles merely hirsutulous below the middle.
Pappus bristles 9 to 18, at base somewhat broadened and often connate into about 5 groups ..... 9. P. exigua.
Pappus bristles 5 to 7, distinct and scarcely dilated at base. ..... 9a. P. exigua pentachaeta.

1. **Ptiloria lactucina** (A. Gray) Greene, Pittonia 2: 133. 1890.
Stephanomeria lactucina A. Gray, Proc. Amer. Acad. 6: 552. 1865.

Yellow pine, aspen, and spruce belts. Oregon, California, and western Nevada.

2. **Ptiloria parryi** (A. Gray) Coville, Contr. U. S. Nat. Herb. **4**: 144. 1893.
Stephanomeria parryi A. Gray, Proc. Amer. Acad. **19**: 61. 1883.
Desert areas and dry mountain sides of the Covillea belt. Southwestern Utah, Arizona, and California.

3. **Ptiloria tenuifolia** (Torr.) Raf. Atl. Journ. 145. 1832.
Prenanthes ? tenuifolia Torr. Ann. Lyc. N. Y. **2**: 210. 1828.
Lygodesmia minor Hook. Fl. Bor. Amer. **1**: 295. *pl. 103, f. A*. 1834.
Stephanomeria minor Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 427. 1841.
Plains and mountain sides, upward to the spruce belt. Montana to Washington, southward to Colorado and California.

3a. **Ptiloria tenuifolia myrioclada** (D. C. Eaton) Blake.
Stephanomeria myrioclada D. C. Eaton in King. Geol. Expl. 40th Par. **5**: 198. *pl. 20, f. 1–4*. 1871.
Covillea and artemisia belts. Nevada, southern California, and Arizona.

4. **Ptiloria cinerea** Blake, Proc. Biol. Soc. Washington **35**: 177. 1922.
Covillea belt. Pahrump Valley and Ash Meadows, Nevada.

5. **Ptiloria lygodesmoides** (Jones) Heller, Muhlenbergia **1**: 7. 1900.
Stephanomeria lygodesmoides Jones; Henderson, Bull. Torrey Club **27**: 349. 1900.
Artemisia belt. Nevada.

6. **Ptiloria pauciflora** (Torr.) Raf. Atl. Journ. 145. 1832.
Prenanthes ? pauciflora Torr. Ann. Lyc. N. Y. **2**: 210. 1828.
? Stephanomeria runcinata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 428. 1841.
Plains and foothills of the Covillea, artemisia, and pinyon belts. Kansas to California, Arizona, and Texas.

7. **Ptiloria paniculata** (Nutt.) Greene, Pittonia **2**: 132. 1890.
Stephanomeria paniculata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 428. 1841.
Plains and rocky hillsides of the artemisia belt. Washington and Idaho to California; Nevada (?) (according to Gray).

8. **Ptiloria virgata** (Benth.) Greene, Pittonia **2**: 130. 1890.
Stephanomeria virgata Benth. Bot. Voy. Sulph. 32. 1844.
Stephanomeria paniculata D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 198. 1871. Not *S. paniculata* Nutt. 1841.
Artemisia belt. Colorado to Oregon and California.

9. **Ptiloria exigua** (Nutt.) Greene, Pittonia **2**: 132. 1890.
Stephanomeria exigua Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 428. 1841.
Plains and foothills of the Covillea and artemisia belts. Wyoming to New Mexico and California.

9a. **Ptiloria exigua pentachaeta** (D. C. Eaton) Davidson & Moxley, Fl. South. Calif. 335. 1923.
Stephanomeria pentachaeta D. C. Eaton in King. Geol. Expl. 40th Par. **5**: 199. *pl. 20, f. 8–10*. 1871.
Ptiloria pentachaeta Greene, Pittonia **2**: 133. 1901.
Stephanomeria exigua pentachaeta H. M. Hall, Univ. Calif. Publ. Bot. **3**: 260. 1907.
Desert areas, Sarcobatus flats, and dry mountain sides of the Covillea and artemisia belts. Utah to California and Arizona.

96. CHAETADELPHA A. Gray

1. **Chaetadelpha wheeleri** A. Gray, Proc. Amer. Acad. **9**: 218. 1874.
Desert areas and washes of the artemisia belt. Oregon and Nevada.

97. NEMOSERIS Greene

Rays white, about 5 mm. long; achenes with slender beak as long as the body; pappus dull white ..... 1. N. californica.
Rays white, veined outside with rose-purple, 15 mm. long or more; achenes with stouter beak shorter than the body; pappus bright white. ..... 2. N. neomexicana.

1. Nemoseris californica (Nutt.) Greene, Pittonia **2**: 193. 1891.
Rafinesquia californica Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 429. 1841.
Moist ground of the Covillea belt. California to Arizona and southwestern Utah.

2. Nemoseris neomexicana (A. Gray) Greene, Pittonia **2**: 193. 1891.
Rafinesquia neomexicana A. Gray, Pl. Wright. **2**: 103. 1853.
Desert areas and hillsides of the Covillea belt. Western Texas to southern Utah and southern California.

98. TRAGOPOGON L. Salsify

Flowers yellow, equaling the involucre ..... 1. T. pratensis.
Flowers purple, shorter than the involucre ..... 2. T. porrifolius.

1. Tragopogon pratensis L. Sp. 789. 1753.
Waste places; introduced from Europe. New Brunswick to New Jersey, Utah, and Montana.

2. Tragopogon porrifolius L. Sp. Pl. 789. 1753.
Along railroads and highways; escaped from cultivation. Ontario to North Carolina, Utah, California, and British Columbia.

99. MALACOTHRIX DC.

Involucre 12 to 15 mm. high, strongly graduated, the phyllaries 3 to 4 mm. broad, with linear green central line and very broad scarious margins, the outer suborbicular to oval, rounded, only the innermost lanceolate and acutish; stem leaves oblong or elliptic to ovate, with cordate-clasping bases, the upper subentire or repand-dentate, rarely lacinate. ..... 1. M. coulteri.
Involucre 5 to 12 mm. high, calyculate but scarcely graduated, the phyllaries 1.5 mm. wide or less, lanceolate to linear, acute or acuminate, with narrow pale margins; leaves linear to oblong or ovate, those of the stem mostly reduced, usually pinnatifid.
Leaf segments linear-filiform, elongate ..... 2. M. glabrata.
Leaf segments oblong or triangular, short, usually toothed.
Achenes 15-ribbed; ligules bright yellow; leaves glabrous.
Achenes 3 mm. long, the 5 stronger ribs somewhat wing-margined; pappus with 2 to 6 persistent outer bristles; inner phyllaries acuminate ..... 3. M. torreyi.
Achenes about 2.2 mm. long, equally 15-striate-ribbed; pappus entirely deciduous; inner phyllaries merely acute ..... 4. M. sonchoides.
Achenes 5-ribbed; ligules white or pink, the throat sometimes yellow; leaves with persistent tufts of tomentum ..... 5. M. floccifera.

1. Malacothrix coulteri A. Gray, Mem. Amer. Acad. n. ser. **4**: 113. 1849.
Snakehead.
Malacolepis coulteri Heller, Muhlenbergia **2**: 147. 1906.
Desert areas of the Covillea belt. Southwestern Utah to southern California.

2. Malacothrix glabrata A. Gray, Syn. Fl. 1²: 422. 1884.
Malacothrix californica glabrata A. Gray; D. C. Eaton in King, Geol. Expl. 40th Par. 5: 201. 1871.
Plains and dry foothills of the Covillea and artemisia belts. Western Utah to Idaho, California, and Arizona.

3. Malacothrix torreyi A. Gray, Proc. Amer. Acad. 9: 213. 1874.
Malacothrix sonchoides D. C. Eaton in King, Geol. Expl. 40th Par. 5: 201. 1871. Not *M. sonchoides* Torr. & Gray, 1843.
Plains and hillsides of the artemisia belt. Oregon to Utah and California.

4. Malacothrix sonchoides (Nutt.) Torr. & Gray, Fl. N. Amer. 2: 486. 1843.
Leptoseris sonchoides Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 439. 1841.
Malacothrix obtusa D. C. Eaton in King, Geol. Expl. 40th Par. 5: 202. 1871. Not *M. obtusa* Benth. 1849.
Malacothrix runcinata A. Nels. Bull. Torrey Club 26: 485. 1899.
Plains, desert areas, and dry foothills of the Covillea and artemisia belts. Nebraska to Idaho and California.

5. Malacothrix floccifera (DC.) Blake, Contr. U. S. Nat. Herb. 22: 656. 1924.
Senecio flocciferus DC. Prodr. 6: 426. 1837.
Malacothrix obtusa Benth. Pl. Hartw. 321. 1849.
Yellow pine belt. Nevada and California.

100. CALYCOSERIS A. Gray

Flowers rose-colored; achenes rugulose, including the beak about 5 mm. long. **1. C. wrightii.**
Flowers yellow; achenes slender, not rugulose, including the beak about 8 mm. long **2. C. parryi.**

1. Calycoseris wrightii A. Gray, Pl. Wright 2: 104. *pl. 14.* 1853.
Plains and rocky hillsides of the Covillea belt. Western Texas to Arizona and Utah.

2. Calycoseris parryi A. Gray in Torr. U. S. & Mex. Bound. Bot. 106. 1859.
Deserts and hillsides of the Covillea belt. Southern Utah, Arizona, and southern California.

101. GLYPTOPLEURA D. C. Eaton

Leaves with conspicuous whitish crustaceous-scarious margin, this cut into short teeth; ligules short, little exserted **1. G. marginata.**
Leaves with narrow white margin, much narrower than its acuminate teeth; ligules long-exserted (10 to 15 mm.) **2. G. setulosa.**

1. Glyptopleura marginata D. C. Eaton in King, Geol. Expl. 40th Par. 5: 207. *pl. 20, f. 11–18.* 1871.
Plains and desert areas of the artemisia belt. Nevada, California, and Arizona.

2. Glyptopleura setulosa A. Gray, Proc. Amer. Acad. 9: 211. 1874.
Plains, valleys, and greasewood flats of the Covillea and artemisia belts. Southern Utah, Arizona (?), Nevada, and southern California.

102. LEONTODON L. Dandelion

Mature achenes reddish **1. L. eriophorum.**
Mature achenes not reddish.
Mature achenes blackish **2. L. lyratum.**

Mature achenes greenish or brownish.
Phyllaries appressed, usually corniculate at apex__3. L. ceratophorum.
Phyllaries not corniculate, the outer spreading or reflexed.
4. L. taraxacum.

1. **Leontodon eriophorum** Rydb. Fl. Rocky Mount. 1035. 1917.
Taraxacum eriophorum Rydb. Mem. N. Y. Bot. Gard. 1: 454. 1900.
Yellow pine belt. Alberta to Wyoming and Utah (according to Rydberg).

2. **Leontodon lyratum** Ledeb. Fl. Atl. 4: 152. 1833.
Taraxacum lyratum DC. Prodr. 7: 148. 1838.
Taraxacum phymatocarpon Vahl. Fl. Dan. 13: 6. *pl. 2298.* 1840.
Taraxacum officinale scopulorum A. Gray, Syn. Fl. 1²: 440. 1884.
Taraxacum scopulorum Rydb. Mem. N. Y. Bot. Gard. 1: 455. 1900.
Leontodon scopulorum Rydb. Fl. Rocky Mount. 1035. 1917.
Spruce and alpine belts. Greenland and arctic America, southward to Arizona. Also in the Old World.

3. **Leontodon ceratophorum** Ledeb. Icon. Pl. Ross. 1: 9. *pl. 34.* 1829.
Taraxacum ceratophorum DC. Prodr. 7: 146. 1839.
Taraxacum palustre D. C. Eaton in King, Geol. Expl. 40th Par. 5: 206. 1871. Not *T. palustre* DC. 1805.
Taraxacum dumetorum Greene, Pittonia 4: 230. 1901.
Leontodon dumetorum Rydb. Fl. Rocky Mount. 1035. 1917.
Yellow pine, aspen, and spruce belts. Labrador to Alaska, southward to New Mexico and California. Also in the Old World.

4. **Leontodon taraxacum** L. Sp. Pl. 798. 1753.
Leontodon vulgare Lam. Fl. Franc. 2: 113. 1778.
Taraxacum officinale Web. Prim. Fl. Holst. 56. 1780.
Taraxacum dens-leonis Desf. Fl. Atlant. 2: 228. 1800.
Taraxacum mexicanum DC. Prodr. 7: 146. 1839.
Leontodon mexicanum Rydb. Fl. Rocky Mount. 1034. 1917.
Waste places: introduced from Europe. Labrador to Alaska, southward to North Carolina, California, and Mexico.

103. SONCHUS L. Sowthistle

Plant perennial, with running rootstocks; heads large, about 2.5 cm. high.
Achenes thickish, little compressed_____1. S. arvensis.
Plants annual; heads smaller, 15 mm. high or less.
Achenes narrow, thickish; plant slender; leaves pinnately parted, the lobes narrow_____2. S. tenerrimus.
Achenes broad, flat, thin-edged; plants stout; leaves unlobed or with broad lobes.
Auricles of leaf bases acute; achenes striate and transversely wrinkled.
3. S. oleraceus.
Auricles of leaf bases rounded; achenes 3-nerved on each face, margined, smooth_____4. S. asper.

1. **Sonchus arvensis** L. Sp. Pl. 793. 1753.
"Utah"; introduced nearly throughout North America.

2. **Sonchus tenerrimus** L. Sp. Pl. 794. 1753.
Mica Spring, Nevada; introduced from Europe. Nevada and California.

3. **Sonchus oleraceus** L. Sp. Pl. 794. 1753.
About settlements; introduced from Europe. A common weed throughout the United States.

4. Sonchus asper (L.) Hill, Herb. Brit. 47. 1769.

Sonchus oleraceus asper L. Sp. Pl. 794. 1753.

Fields and canyons of the Great Basin; introduced from Europe. A weed throughout the United States.

104. LACTUCA L. Lettuce

Leaves not spinulose; involucre 12 to 20 mm. high; flowers blue; beak of achenes stout, short, about half as long as the body.....1. L. pulchella.

Leaves spinulose on margin and midrib; involucre 12 mm. high or less; flowers pale yellow, turning bluish; beak of achenes very slender, equaling or exceeding the body.

Leaves deeply lobed.....2. L. scariola.

Leaves entire or subentire.....2a. L. scariola integrata.

1. Lactuca pulchella (Pursh) DC. Prodr. 7: 134. 1838.

Sonchus pulchellus Pursh, Fl. Amer. Sept. 502. 1814.

Mulgedium pulchellum Torr. & Gray, Fl. N. Amer. 2: 497. 1843.

Meadows and moist ravines of the artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, southward to Missouri and California.

2. Lactuca scariola L. Sp. Pl. ed. 2. 1119. 1763.

Waste places; introduced from Europe. Nearly throughout the United States.

2a. Lactuca scariola integrata Gren. & Godr. Fl. France 2: 320. 1850.

Lactuca angustana All. Fl. Pedem. 1: 224. *pl. 52, f. 1.* 1785.

Lactuca integrata A. Nels. in Coulter, New Man. Rocky Mount. Bot. 596. 1909.

Lactuca virosa Rydb. Fl. Rocky Mount. 1036. 1917. Not *L. virosa* L. 1753.

Waste places; introduced from Europe. Nearly throughout the United States.

105. LYGODESMIA D. Don

Branches and branchlets spine-tipped, divaricate-spreading, rigid.....1. L. spinosa.

Branches and branchlets not spine-tipped.

Plant annual, about 15 cm. high or less; achenes about 3.5 mm. long, longer than the bright white pappus; involucre about 5 mm. high.....2. L. exigua.

Plants perennial, usually about 30 cm. high or more; achenes 5 to 10 mm. long; pappus brownish; involucre 10 to 20 mm. high.

Involucre about 20 mm. high; achenes about 12 mm. long.....3. L. grandiflora.

Involucre 10 to 12 mm. high; achenes about 5 mm. long.....4. L. juncea

1. Lygodesmia spinosa Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 444. 1841.

Pleiacanthus spinosus Rydb. Fl. Rocky Mount. 1023. 1917.

Plains and dry mountain sides of the artemisia, pinyon, and yellow pine belts. Montana to British Columbia, California, and Arizona.

2. Lygodesmia exigua A. Gray, Proc. Amer. Acad. 9: 217. 1874.

Prenanthes exigua A. Gray, Pl. Wright. 2: 105. 1853.

Prenanthella exigua Rydb. Bull. Torrey Club 33: 161. 1906.

Desert areas and stony hillsides of the Covillen and artemisia belts. Colorado to Texas, Utah, and California.

3. Lygodesmia grandiflora (Nutt.) Torr. & Gray, Fl. N. Amer. **2**: 485. 1843.
Erythremia grandiflora Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 445. 1841.
Lygodesmia juncea dianthopsis D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 200. 1871.

Gravelly hills of the artemisia, pinyon, and yellow pine belts. Wyoming to New Mexico, westward to Idaho and Arizona.

4. Lygodesmia juncea (Pursh) D. Don, Edinburgh Phil. Journ. **6**: 311. 1829.
Prenanthes juncea Pursh, Fl. Amer. Sept. 498. 1814.

Plains and hillsides of the artemisia and pinyon belts; Unionville Valley, Nevada. Minnesota to Missouri, westward to British Columbia, New Mexico, and Nevada.

106. AGOSERIS Raf.

Beak of achenes slender, as long as the body or longer, rarely slightly shorter.
  Plant annual; achene body about 3 mm. long, the very slender beak twice as long ---- **1. A. heterophylla.**
  Plants perennial; body of the achene 4 to 8 mm. long.
    Body of achenes truncate at apex, abruptly beaked. Inner phyllaries in fruit 3 to 4.5 cm. long, nearly linear, much exceeding the outer phyllaries ---- **2. A. retrorsa.**
    Body of achenes tapering at apex.
      Beak of achenes twice as long as the body or more; inner phyllaries, even in young fruit, about twice as long as the outer. Involucre in fruit 3 to 3.5 cm. high ---- **3. A. grandiflora.**
      Beak of achenes not twice as long as the body; phyllaries more evenly graduated, in fruit 2.5 cm. (rarely 3 cm.) high or less.
        Flowers light yellow, often turning pinkish.
          Beak distinctly exceeding the body of the achenes; involucre in fruit 3 cm. wide or more; plant tall, 30 to 50 cm. high. **4. A. elata.**
          Beak not exceeding the body of the achenes; involucre in fruit usually less than 3 cm. thick; plant lower, 40 cm. high or usually much less ---- **5. A. arizonica.**
        Flowers deep orange or brownish red, changing to purple.
          Beak of the achenes distinctly and considerably shorter than the body; outer phyllaries chiefly oblong or lance-ovate, often obtuse ---- **6. A. aurantiaca.**
          Beak of achenes equaling or somewhat exceeding the body; all the phyllaries lanceolate or linear-lanceolate, acuminate.
            Leaves lanceolate to linear-lanceolate, often with a few short lobes ---- **7. A. gracilens.**
            Leaves narrowly lance-linear or linear, often with linear lobes. **7a. A. gracilens greenei.**

Beak of achenes short, scarcely half as long as the body.
  Plants tall, stout, 30 to 50 cm. high or more. Leaves glabrous and glaucous, usually entire, sometimes with a few teeth or lobes.
    Involucre glabrous or rarely tomentose at extreme base; phyllaries not ciliate.
      Leaves lanceolate, 8 to 30 mm. wide; involucre 2 cm. high or more. **8. A. glauca.**
      Leaves linear or linear-lanceolate, 2 to 8 mm. wide; involucre 1 to 1.5, rarely 2 cm. high ---- **8a. A. glauca parviflora.**
    Involucre pilose, the phyllaries ciliate ---- **9. A. scorzoneraefolia.**

Plants low, 15 cm. high or less or, if taller, the leaves either densely pubescent or laciniate-pinnatifid.

Leaves entire or merely slightly toothed, lanceolate, densely pubescent.
9a. A. scorzoneraefolia aspera.

Leaves laciniate-pinnatifid, or rarely very narrowly linear and subentire, usually glaucous and glabrous, sometimes pubescent.
10. A. taraxacifolia.

1. Agoseris heterophylla (Nutt.) Greene, Pittonia **2**: 178. 1891.
Macrorhynchus heterophyllus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 430. 1841.
Troximon heterophyllum Greene, Bull. Torrey Club **10**: 88. 1882.
Plains, hillsides, and canyons of the artemisia and pinyon belts. Idaho to British Columbia, Utah, and California.

2. Agoseris retrorsa (Benth.) Greene, Pittonia **2**: 178. 1891.
Macrorhynchus retrorsus Benth. Pl. Hartw. 320. 1849.
Troximon retrorsum A. Gray, Proc. Amer. Acad. **9**: 216. 1874.
Pine forests and grassy slopes, at 1,800 to 2,700 meters. Idaho and Washington to Nevada and California.

3. Agoseris grandiflora (Nutt.) Greene, Pittonia **2**: 178. 1891.
Stylopappus grandiflorus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 432. 1841.
Macrorhynchus grandiflorus Torr. & Gray, Fl. N. Amer. **2**: 492. 1843.
Troximon grandiflorum Gray, Proc. Amer. Acad. **9**: 216. 1874.
Artemisia, pinyon, and yellow pine belts. Idaho to British Columbia, California, and Utah.

4. Agoseris elata (Nutt.) Greene, Pittonia **2**: 177. 1891.
Stylopappus elatus Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 433. 1841.
Troximon nuttallii A. Gray, Proc. Amer. Acad. **9**: 216. 1874.
Yellow pine, aspen, and spruce belts. Montana to British Columbia, California, and Colorado.

5. Agoseris arizonica Greene, Pittonia **2**: 176. 1891.
Troximon arizonicum Greene, Pittonia **2**: 78. 1890.
Agoseris leptocarpa Osterhout, Muhlenbergia **1**: 143. 1906.
Agoseris longirostis Greene, Leaflets **2**: 125. 1911.
Aspen and spruce belts. Wyoming to New Mexico, Arizona, and Utah.

6. Agoseris aurantiaca (Hook.) Greene, Pittonia **2**: 177. 1891.
Troximon aurantiacum Hook. Fl. Bor. Amer. **1**: 300. *pl. 104*. 1834.
Macrorhynchus troximoides Torr. & Gray, Fl. N. Amer. **2**: 491. 1843.
Troximon aurantiacum purpureum A. Gray, Syn. Fl. **1**^{2}: 438. 1884.
Agoseris purpurea Greene, Pittonia **2**: 177. 1891.
Aspen, spruce, and alpine belts. Alberta and British Columbia to Arizona and New Mexico.

7. Agoseris gracilens (A. Gray) Kuntze, Rev. Gen. Pl. **1**: 304. 1891.
Troximon gracilens A. Gray, Proc. Amer. Acad. **19**: 71. 1883.
Agoseris gracilenta Greene, Pittonia **2**: 177. 1891.
Pinyon, yellow pine, and aspen belts. Alberta and British Columbia to Utah and Colorado.

7a. Agoseris gracilens greenei (A. Gray) Blake.
Troximon gracilens greenei A. Gray, Proc. Amer. Acad. **19**: 71. 1883.
Agoseris greenei Rydb. Mem. N. Y. Bot. Gard. **1**: 459. 1900.
Agoseris graminifolia Rydb. Fl. Rocky Mount. 1032, in part, as to our range. 1917. Not *A. graminifolia* Greene, 1898.
Aspen and spruce belts. Oregon, California, and Utah.

8. Agoseris glauca (Pursh) D. Dietr. Syn. Pl. **4**: 1332. 1847.

Troximon glaucum Pursh, Fl. Amer. Sept. 505. 1814.

Macrorrhynchus glaucus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 204. 1871.

Agoseris isomeris Greene, Leaflets **2**: 123. 1911.

Plains and mountain sides, upward to 3,000 meters. Manitoba to British Columbia, southward to South Dakota, New Mexico, and Nevada.

8a. Agoseris glauca parviflora (Nutt.) Rydb. Contr. U. S. Nat. Herb. **3**: 511. 1896.

Troximum parviflorum Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 434. 1841.

Agoseris parviflora D. Dietr. Syn. Pl. **4**: 1332. 1847.

Troximon glaucum parviflorum A. Gray, Syn. Fl. **1**^{2}: 437. 1884.

Agoseris confinis Greene, Leaflets **2**: 124. 1911.

? *Agoseris longula* Greene, Leaflets **2**: 125. 1911.

Artemisia, pinyon, and yellow pine belts. Manitoba to Washington, southward to North Dakota, Utah, and New Mexico.

9. Agoseris scorzoneraefolia (Schrad.) Greene, Pittonia **2**: 177. 1891.

Ammogeton scorzoneraefolia Schrad. "Ind. Sem. Hort. Goett. 1833"; DC. Prodr. **7**: 98. 1838.

Troximon glaucum dasycephalum Torr. & Gray, Fl. N. Amer. **2**: 490. 1843.

Artemisia, pinyon, and yellow pine belts. South Dakota to British Columbia, southward to Colorado, Nevada (according to Rydberg), and Oregon.

9a. Agoseris scorzoneraefolia aspera (Rydb.) Blake.

Agoseris leontodon aspera Rydb. Mem. N. Y. Bot. Gard. **1**: 457. 1900.

Agoseris villosa Rydb. Mem. N. Y. Bot. Gard. **1**: 458. 1900.

Spruce and subalpine belts. Montana to British Columbia, southward to Utah.

10. Agoseris taraxacifolia (Nutt.) D. Dietr. Syn. Pl. **4**: 1332. 1847.

Troximon taraxacifolium Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 434. 1841.

Macrorrhynchus grandiflorus D. C. Eaton in King, Geol. Expl. 40th Par. **5**: 206. 1871. Not *M. grandiflorus* Torr. & Gray, 1843.

Macrorrhynchus glaucus laciniatus D. C. Eaton in King. Geol. Expl. 40th Par. **5**: 204. 1871.

Troximon glaucum laciniatum A. Gray, Bot. Calif. **1**: 437. 1876.

? *Agoseris dasycarpa* Greene, Pittonia **3**: 21. 1896.

Agoseris dens-leonis Greene, Erythea **3**: 23. 1895.

Agoseris leontodon Rydb. Mem. N. Y. Bot. Gard. **1**: 457, 1900.

Agoseris agrestis Osterhout, Bull. Torrey Club **28**: 645. 1901.

Agoseris taraxacoides Greene, Leaflets **2**: 123. 1911.

Agoseris caudata Greene, Leaflets **2**: 124. 1911.

Agoseris laciniata Rydb. Fl. Rocky Mount. 1032. 1917. Not *Stylopappus laciniatus* Nutt. 1841.

Aspen and spruce belts. Montana to British Columbia, California, and Utah.

107. CREPIS L.

Plant depressed, tufted, 5 to 10 cm. high, strictly glabrous, glaucescent; basal leaves obovate to suborbicular, usually entire, not over 6 cm. long; achenes with a slight disk at apex, bearing the soft deciduous pappus.

1. C. nana.

Plant erect, 15 cm. high or usually much more, often pubescent; basal leaves much larger; achenes without a terminal disk, the pappus persistent.

Plant glabrous except for the usually hispid or tomentose pedicels, or the stem sometimes sparsely hispid, never tomentose or furfuraceous.

Involucre and pedicles strictly glabrous, or the involucre rarely obscurely tomentulose when young_____2. C. glauca.
Involucre and upper part of pedicles hispid or glandular-hispid and usually somewhat tomentulose.
Involucre 15 to 20 mm. high, evenly but rather sparsely glandular-hispidulous; achenes narrowed into a short but evident beak.
3. C. andersoni.
Involucre 8 to 12 mm. high, glandular-hispidulous and usually black-hispid, also usually somewhat tomentulose; achenes not beaked.
4. C. runcinata.
Plant canescent-tomentulose or furfuraceous.
Involucre glabrous, 5 to 7-flowered_____5. C. acuminata.
Involucre tomentose or tomentulose.
Involucre narrow, cylindric, its principal bracts 5 to 8 (rarely 9 to 14); flowers of the same number.
Leaves broadly lanceolate, oblong-lanceolate, or ovate in outline, deeply laciniate-pinnatifid, the rachis much broader than the breadth of the lobes_____6. C. intermedia.
Leaves divided nearly to midrib into very narrowly linear or almost filiform lobes, the rachis scarcely broader than the breadth of the lobes_____6a. C. intermedia gracilis.
Involucre campanulate, its principal bracts 9 to 18; flowers 10 to 20.
Achenes prominently ribbed at maturity; black bristly hairs of involucre, when present, glanduliferous_____7. C. occidentalis.
Achenes not ribbed at maturity; black bristly hairs of involucre not glanduliferous_____8. C. scopulorum.

1. Crepis nana Richards. App. Frankl. Journ. 757. 1823.
Youngia nana Rydb. Fl. Rocky Mount. 1021. 1917.
Spruce and subalpine belts. Labrador to British Columbia, southward to Utah (according to Rydberg).

2. Crepis glauca (Nutt.) Torr. & Gray, Fl. N. Amer. 2: 488. 1843.
Crepidium glaucum Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 436. 1841.
Valleys and meadows, upward to 2,100 meters. Saskatchewan and Alberta, southward to Colorado, Utah, and Nevada.

3. Crepis andersoni A. Gray, Proc. Amer. Acad. 6: 553. 1865.
Valleys and hillsides of the artemisia belt. California and Nevada.

4. Crepis runcinata (James) Torr. & Gray, Fl. N. Amer. 2: 487. 1843.
Hieracium runcinatum James in Long, Exped. 1: 453. 1823.
Crepis platyphylla Greene, Pittonia 3: 27. 1896.
Crepis runcinata ciliosa Greene, Pittonia 3: 107. 1896.
Crepis subcarnosa Greene, Pittonia 3: 107. 1896.
Crepis riparia A. Nels. Bull. Torrey Club 26: 486. 1899.
Crepis petiolata Rydb. Bull. Torrey Club 32: 134. 1905.
Crepis perplexans Rydb. Bull. Torrey Club 32: 134. 1905.
Crepis denticulata Rydb. Bull. Torrey Club 32: 135. 1905.
Crepis riparia parva A. Nels. in Coulter, New Man. Rocky Mount. 593. 1909.
Crepis aculeolata Greene, Leaflets 2: 86. 1910.
Plains, canyons, and mountain sides, upward to 2,700 meters. Saskatchewan to Montana, southward to Colorado, Utah, and New Mexico.

5. Crepis acuminata Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 437. 1841.
Foothills and canyons of the artemisia, pinyon, and yellow pine belts. Montana and British Columbia, southward to Utah and California.

6. Crepis intermedia A. Gray, Syn. Fl. 1²: 432. 1884.

Canyons and mountain slopes of the artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, southward to Colorado and California.

6a. Crepis intermedia gracilis (D. C. Eaton) A. Gray, Syn. Fl. 1²: 432. 1884.

Crepis occidentalis gracilis D. C. Eaton in King, Geol. Expl. 40th Par. 5: 203. 1871.

Crepis gracilis Rydb. Mem. N. Y. Bot. Gard. 1: 461. 1900.

Canyons and mountain slopes of the yellow pine, aspen, and spruce belts. Montana to Washington, Colorado, and Utah.

7. Crepis occidentalis Nutt. Journ. Acad. Phila. 7: 29. 1834.

Crepis occidentalis costata A. Gray, Bot. Calif. 1: 435. 1876.

Crepis grandifolia Greene, Pittonia 3: 107. 1896.

Crepis pumila Rydb. Mem. N. Y. Bot. Gard. 1: 462. 1900.

Plains, canyons, and mountain slopes of the artemisia, pinyon, and yellow pine belts. Saskatchewan to British Columbia, southward to Colorado, Arizona, and California.

8. Crepis scopulorum Coville, Contr. U. S. Nat. Herb. 3: 564. *pl. 24.* 1896.

Canyons and mountain sides of the artemisia, pinyon, and yellow pine belts. Montana to Colorado, westward to Oregon and Nevada.

108. HIERACIUM L. Hawkweed

Flowers white or ochroleucous; stem (except at base) and involucre glabrous, or the involucre merely puberulous or with a few long hairs.
1. H. albiflorum.

Flowers yellow; stem or involucre, or both, more or less densely pubescent.

Plant low and slender, usually 25 cm. high or less; leaves glabrous or sparsely pilose, 7 cm. long or less; stem naked or with 1 or 2 small bracts——**2. H. gracile.**

Plant usually tall and stout, 30 cm. high or more (lower in No. 3); leaves densely long-pilose; stem leafy.

Stems usually low (25 cm. high or less), tufted from the rootstocks; involucre 5 to 8 mm. high; pappus dull brownish——**3. H. horridum.**

Stems usually tall, 0.3 to 1 meter high, not tufted; involucre 8 to 10 mm. high; pappus dull whitish——**4. H. scouleri.**

1. Hieracium albiflorum Hook. Fl. Bor. Amer. 1: 298. 1834.

? *Hieracium kennedyii* Gandog. Bull. Soc. Bot. France 65: 51. 1918.

Yellow pine, aspen, and spruce belts. Saskatchewan to Alaska, southward to Colorado and California.

2. Hieracium gracile Hook. Fl. Bor. Amer. 1: 298. 1834.

Hieracium triste D. C. Eaton in King, Geol. Expl. 40th Par. 5: 200. 1871. Not *H. triste* Willd. 1826.

? *Hieracium utahense* Gandog. Bull. Soc. Bot. France 65: 49. 1918.

Spruce and alpine belts. Montana to Alaska, southward to New Mexico and California.

3. Hieracium horridum Fries, Epic. Hier. 154. 1862.

Yellow pine, aspen, spruce, and subalpine belts. Western Nevada and California.

4. Hieracium scouleri Hook. Fl. Bor. Amer. 1: 298. 1834.

Hieracium griseum Rydb. Mem. N. Y. Bot. Gard. 1: 464. 1900.

Hieracium albertinum Farr, Ottawa Nat. 20: 109. 1906.

Artemisia, pinyon, and yellow pine belts. Montana and British Columbia, southward to Utah and California.

ADDITIONS AND EMENDATIONS

Page 37, after line 5, insert:

Leaves commonly fascicled, cuneate. Calyx toothed; corolla tubular-funnelform, yellow----------**Lycium** (p. 471).

Leaves alternate, the base usually not cuneate.

Calyx of 2 to 5 sepals; corolla none----**36. CHENOPODIACEAE** (p. 164).

Calyx 4 or 5-toothed; petals present----**77. RHAMNACEAE** (p. 349).

Page 136, insert the following:

15a. Salix geyeriana argentea (Bebb) C. Schneid. Journ. Arnold Arb. **2**: 24. 1920.

Salix macrocarpa argentea Bebb, Bot. Gaz. **10**: 223. 1885.

Differs from the species in its pubescent twigs and rather densely and permanently silvery-pilose leaves. California and western Nevada to Colorado and Wyoming.

16a. Salix bebbiana perrostrata (Rydb.) C. Schneid. Journ. Arnold Arb. **2**: 71. 1920.

Salix perrostrata Rydb. Bull. N. Y. Bot. Bard. **2**: 173. 1901.

Most of the material in the Rocky Mountains and westward represents this variety, with smaller, thinner, scarcely rugose, glabrous or glabrate leaves.

Page 326, after *Astragalus palans* insert:

38a. Astragalus mohavensis S. Wats. Proc. Amer. Acad. **20**: 361. 1885.

A prostrate silvery-strigose plant, reported from Charleston Mountains, Nevada. It inhabits desert areas and hillsides of southeastern California.

Page 351, after *Ceanothus cordulatus* insert:

3. CONDALIA Cav.

1. Condalia lycioides canescens Trel. in A. Gray, Syn. Fl. 1^1: 403. 1897.

Specimens with undeveloped fruit appear to belong to this species. Mesa west of Las Vegas, Nevada. Arizona and southern California.

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[Synonyms in italic]

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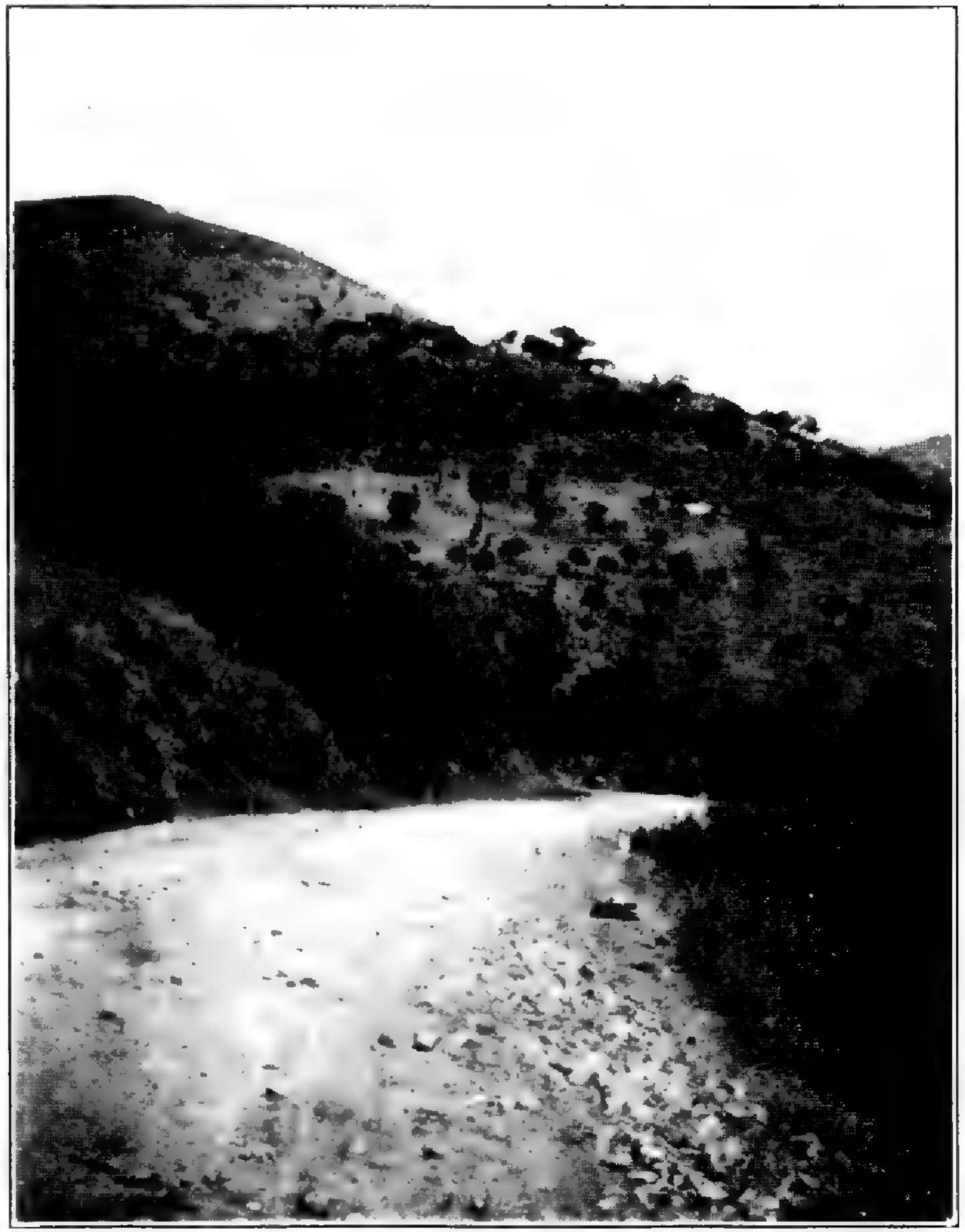
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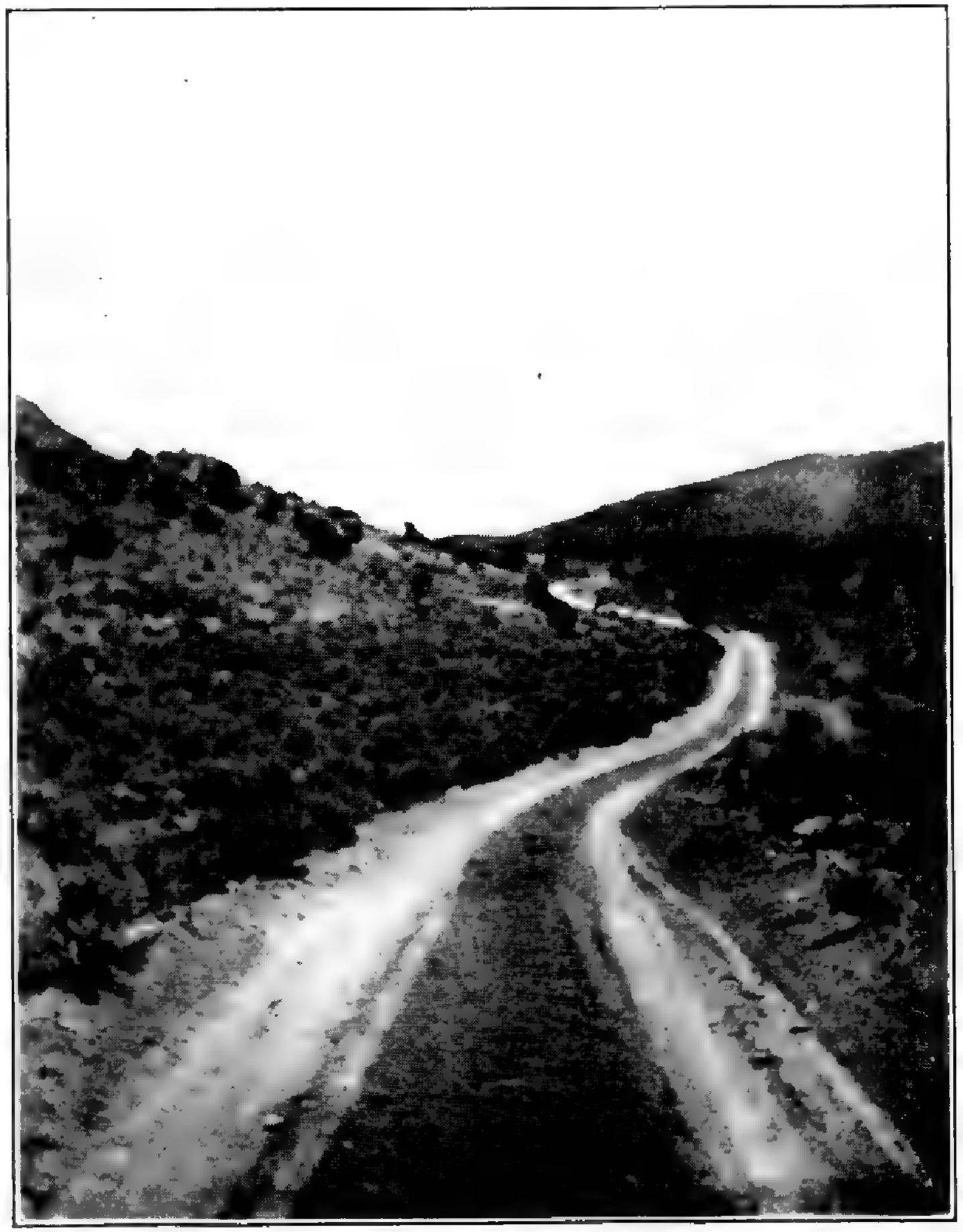
A. VALLEY OF THE JABLON RIVER, SPAIN, SHOWING "BARE" MOUNTAINS AND ERODED CLIFFS



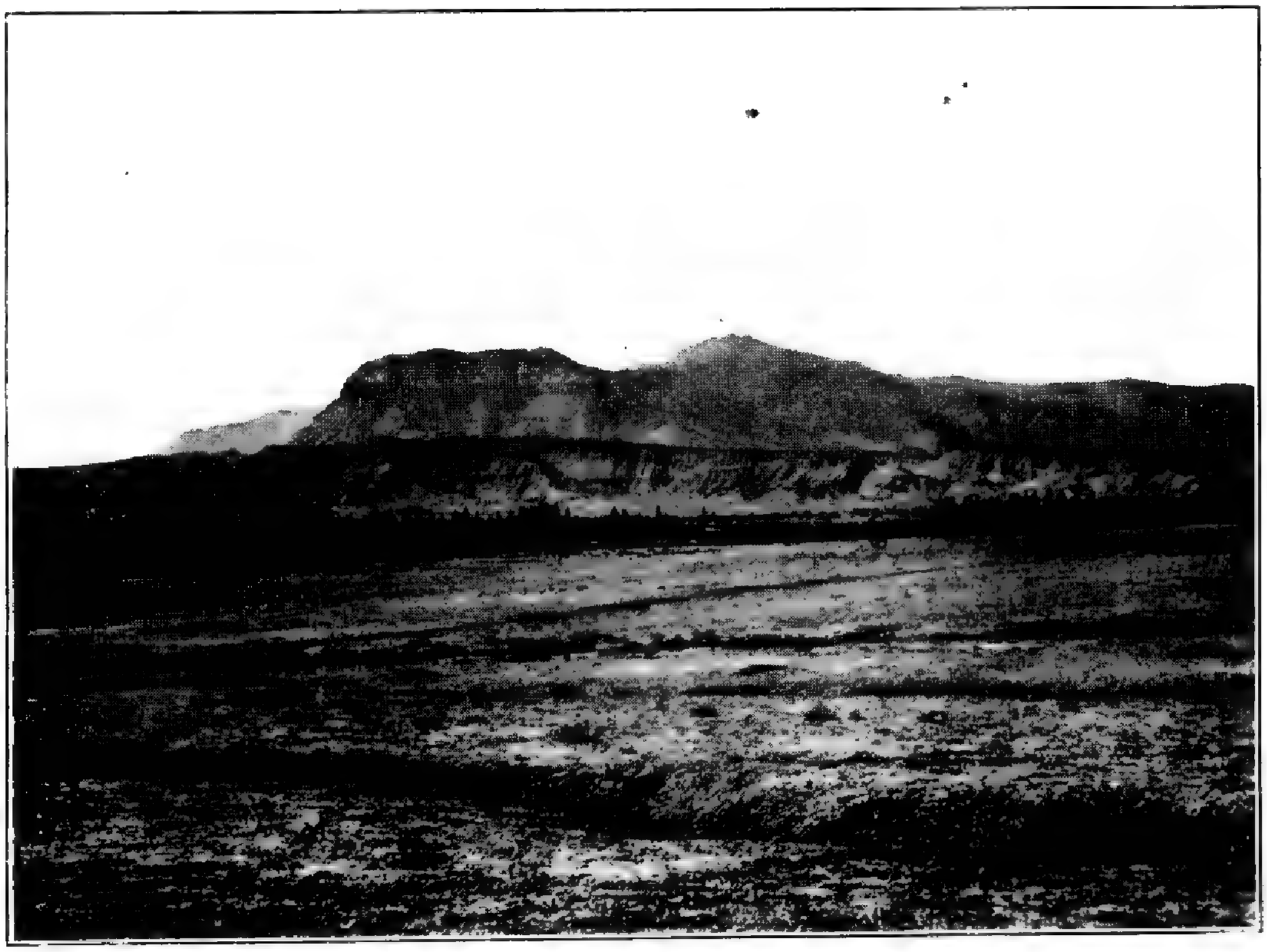
B. VIEW NEAR SIGUENZA, SPAIN, SHOWING BUTTES AND "BARE" MOUNTAINS



A. OAK-PINYON BELT, SIERRA MORENA, SPAIN, NEAR CORDOBA



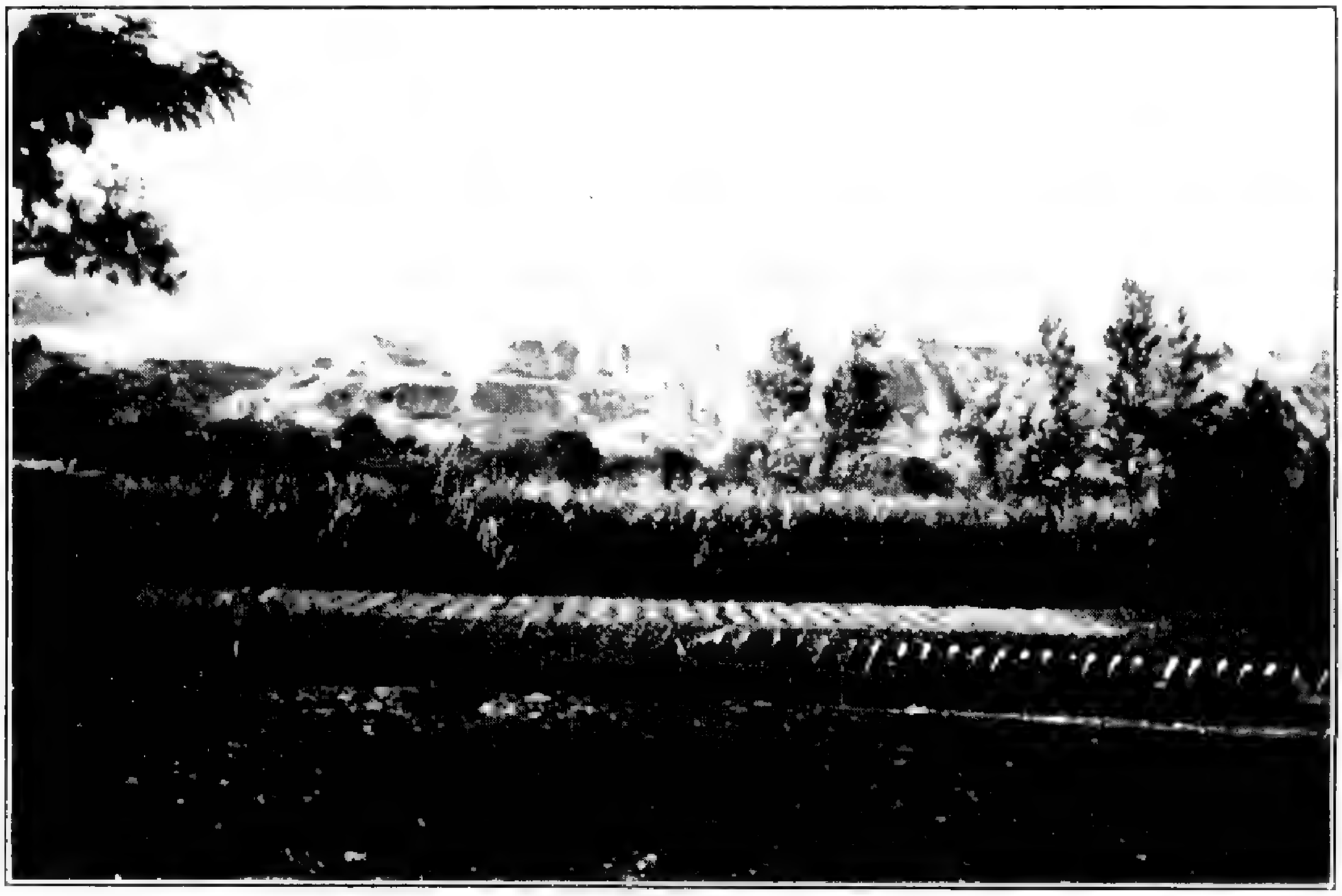
B. JUNIPER-PINYON BELT, SOUTHERN NEVADA, NORTH OF ST. THOMAS



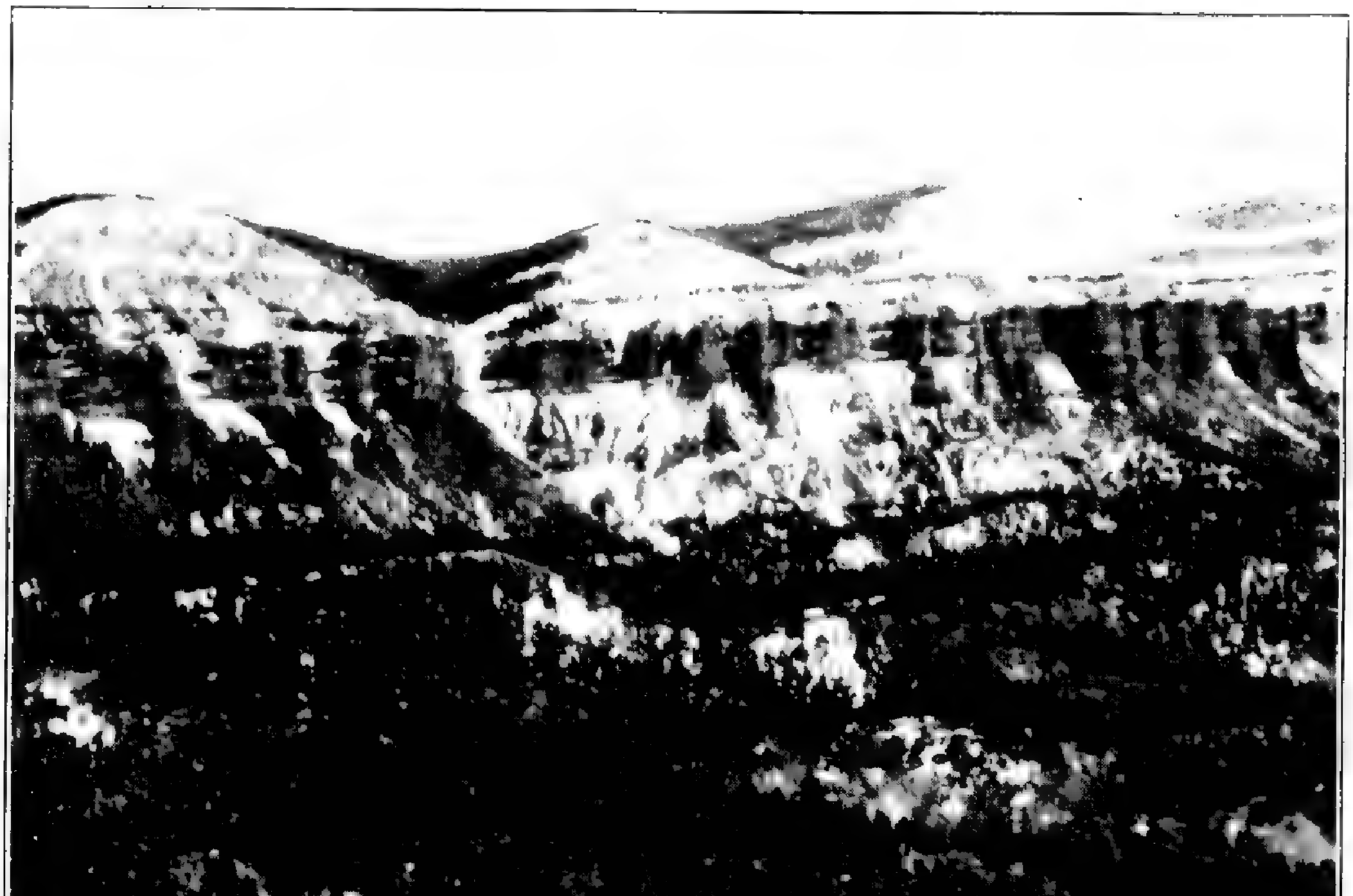
A. ARTEMISIA BELT, NEAR EMERY, UTAH, SHOWING THE EVER-PRESENT LOMBARDY POPLAR



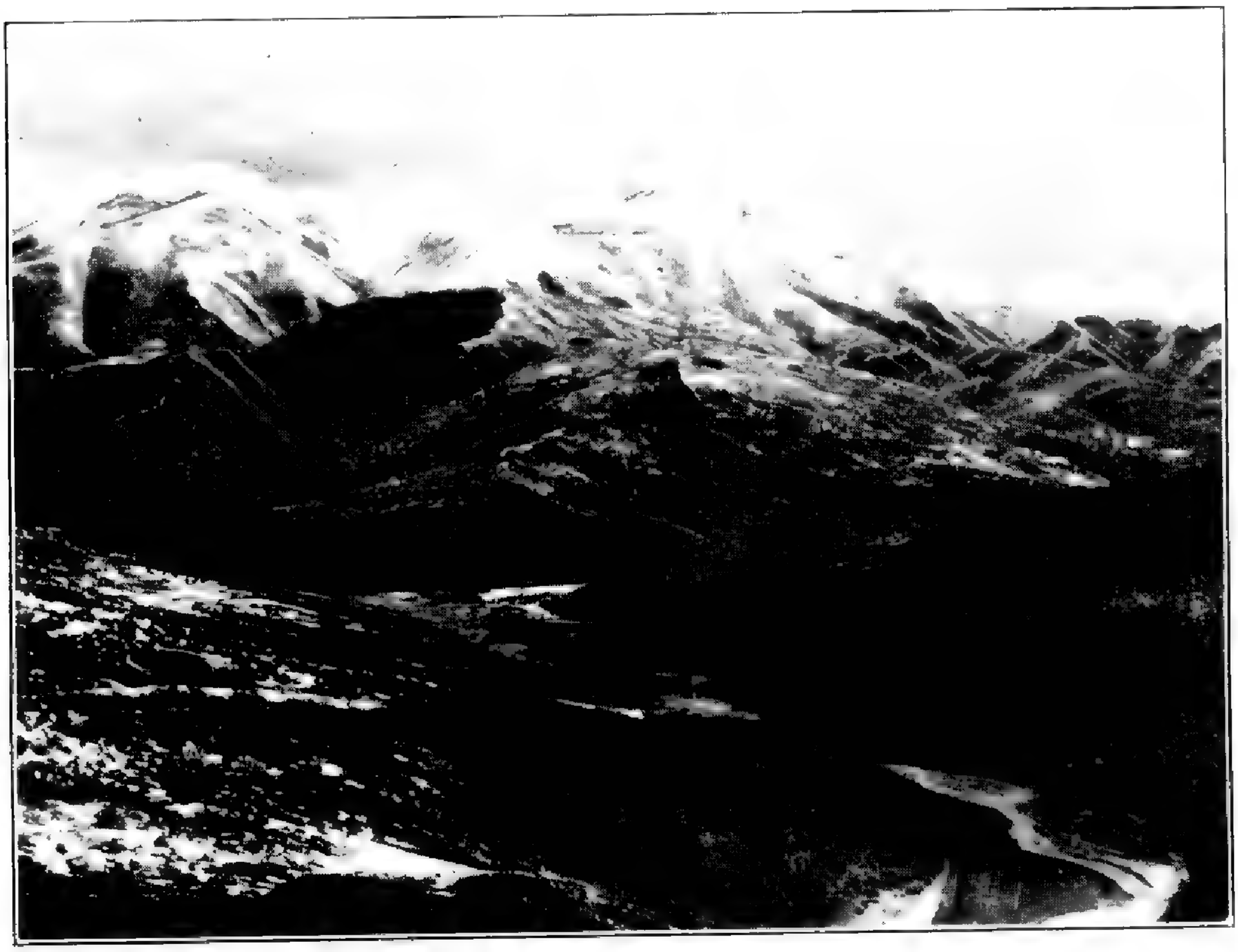
B. VIEW OF THE PLATEAU OF NEW CASTILE, NORTHEAST OF MADRID, SPAIN, SHOWING LOMBARDY POPLARS IN THE DISTANCE



A. VIEW SHOWING ERODED CLIFFS BETWEEN SIGUENZA AND ZARAGOZA, SPAIN



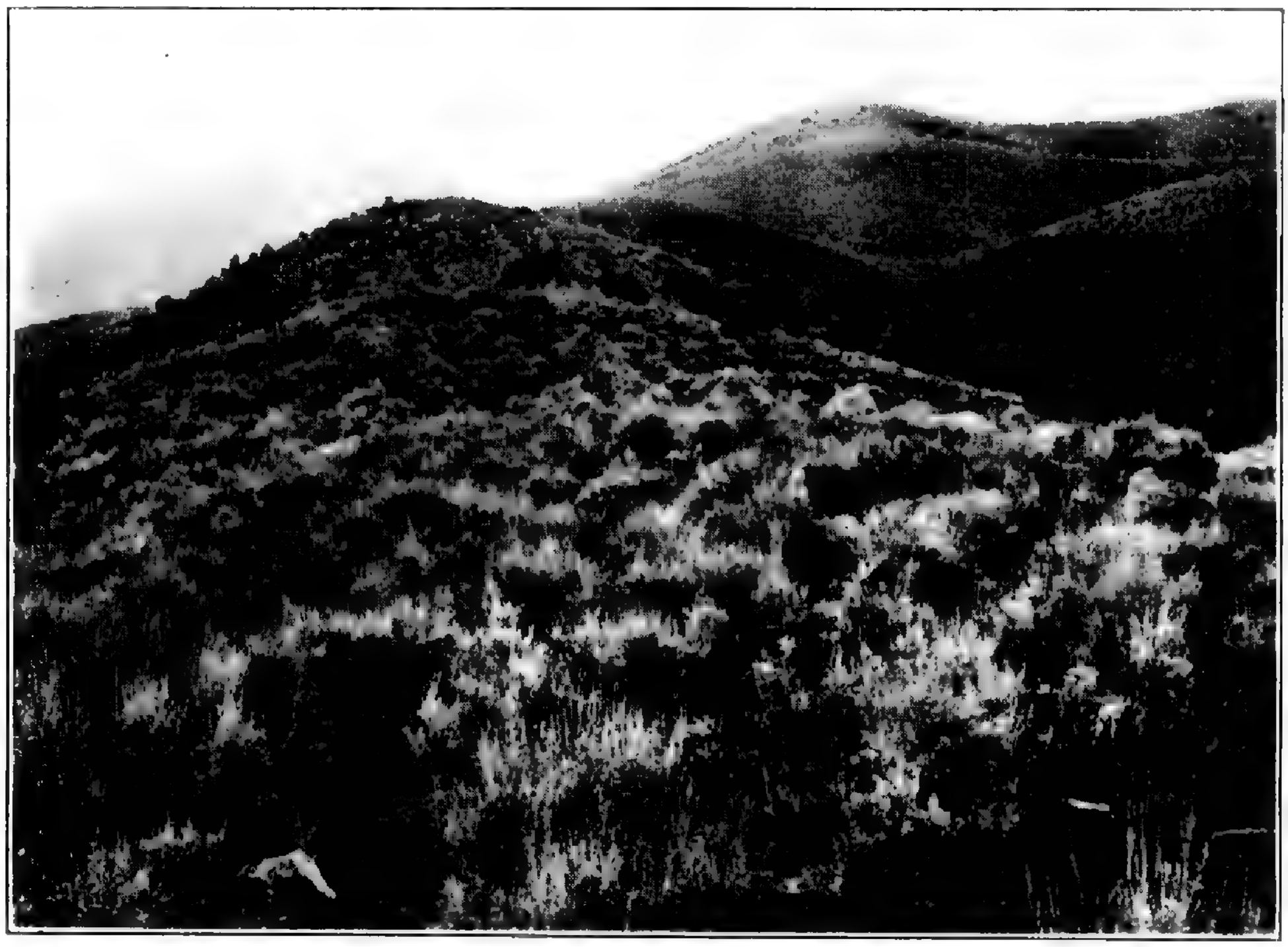
B. VIEW SHOWING ERODED CLIFFS, SOUTH-CENTRAL UTAH



A. WASATCH MOUNTAINS NEAR THISTLE JUNCTION, UTAH, SHOWING THEIR RUGGED NATURE. SIMILAR IN ASPECT TO THE SIERRA NEVADA, SPAIN



B. WASATCH PLATEAU, EAST OF EPHRAIM, UTAH, ELEVATION 3,000 METERS, SHOWING SCATTERED AND REDUCED INDIVIDUALS OF PICEA ENGELMANNII AND ABIES LASIOCARPA



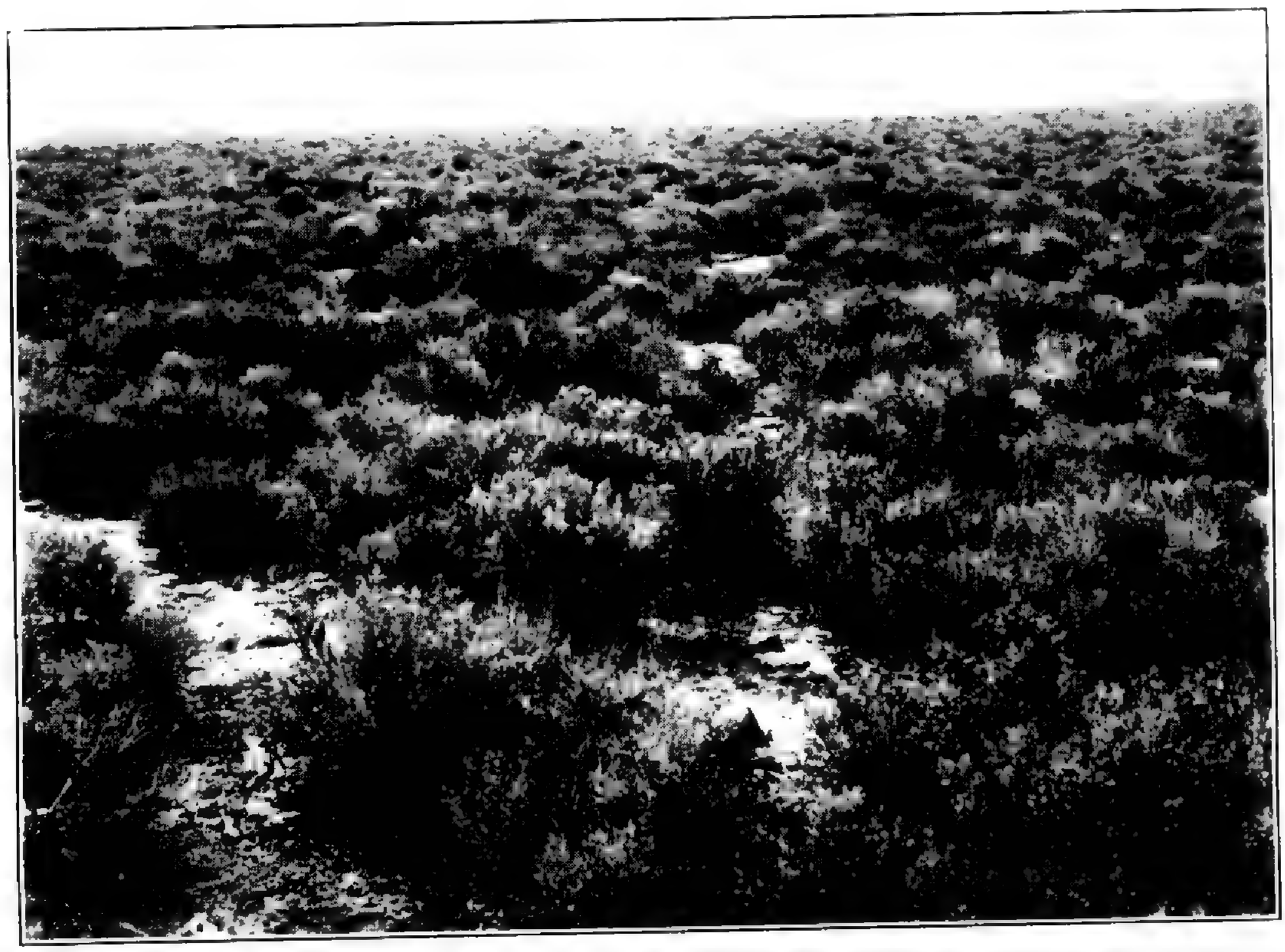
A. SAGEBRUSH ASSOCIATION, AUSTIN, NEVADA

A pure stand of sagebrush (*Artemisia tridentata*) on hilly land. Juniper is shown at the back. Good sagebrush land is free from harmful amounts of salt, and is deep and well watered, at least at the beginning of the growth period



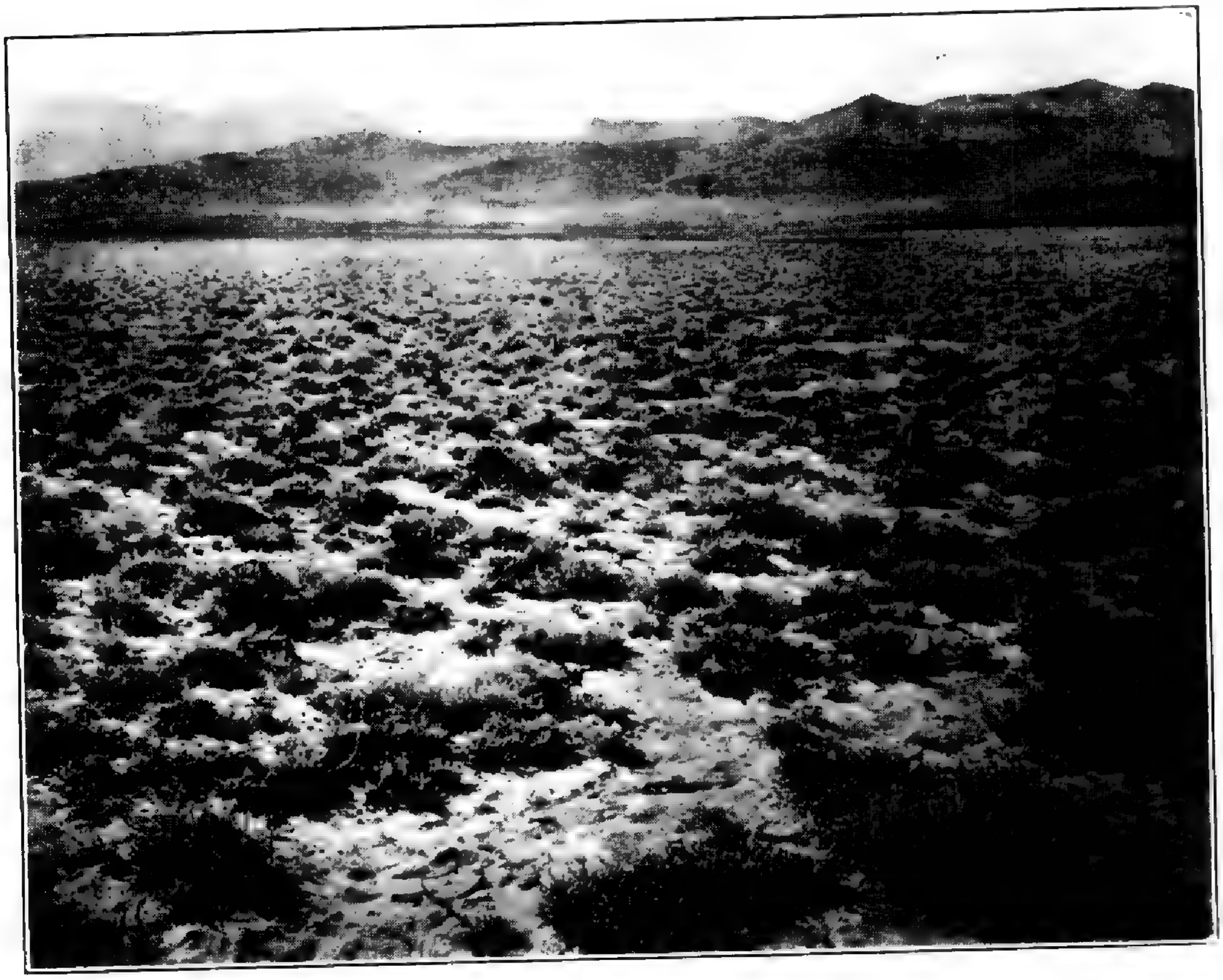
B. SMALL SAGEBRUSH ASSOCIATION, ELY, NEVADA

A pure stand of small sagebrush (*Artemisia nova*) on thin soil; growth relatively good. Soil under this type is usually thin and stony and for crop production is not so good as sagebrush land



A. SHADSCALE ASSOCIATION, TOOELE, UTAH

A luxuriant growth of shadscale (*Atriplex confertifolia*). Land of this type is usually rather heavy in texture and contains harmful amounts of salt in the second and third feet of soil



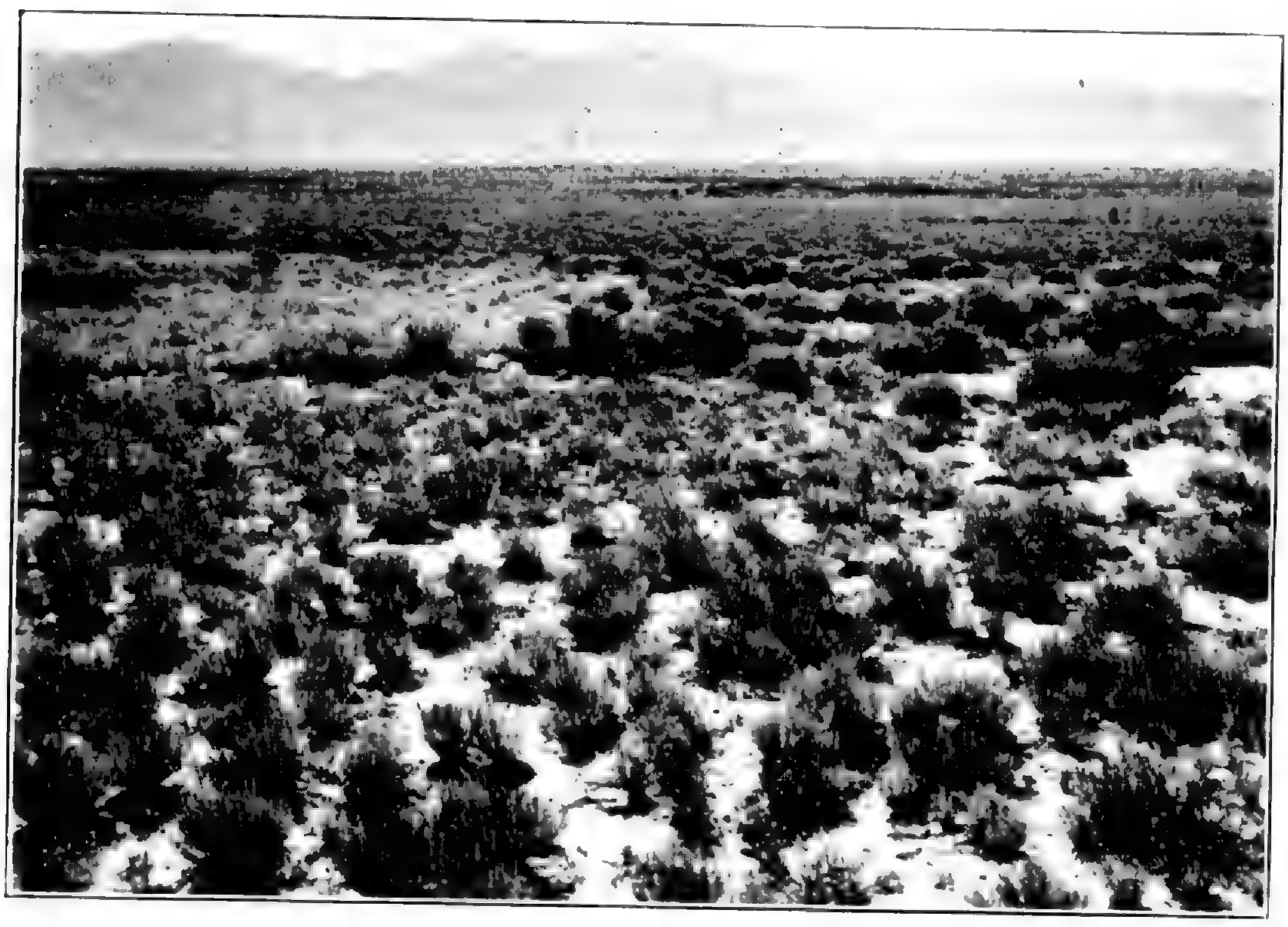
B. WINTER-FAT ASSOCIES, MILFORD, UTAH

A pure stand and good even growth of winter-fat (*Eurotia lanata*). This is probably the most valuable winter grazing land in the Great Basin. Extensive areas occur in both Utah and Nevada



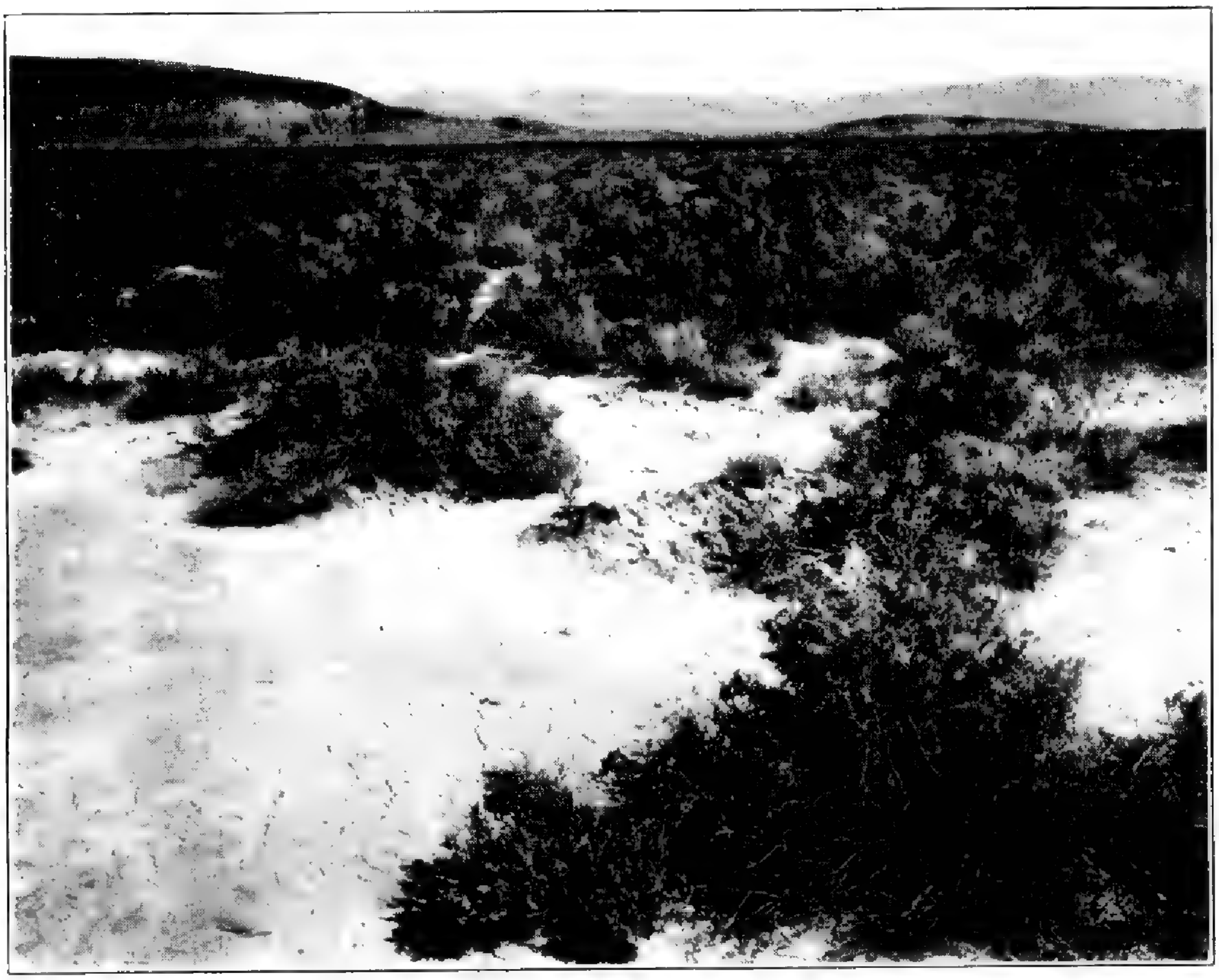
A. MAT SALTBUSH ASSOCIATION, GREEN RIVER, UTAH

Mat saltbush (*Atriplex corrugata*), with *Eriogonum inflatum* occurring in the interspaces. This soil is high in salt content, and relatively heavy in texture



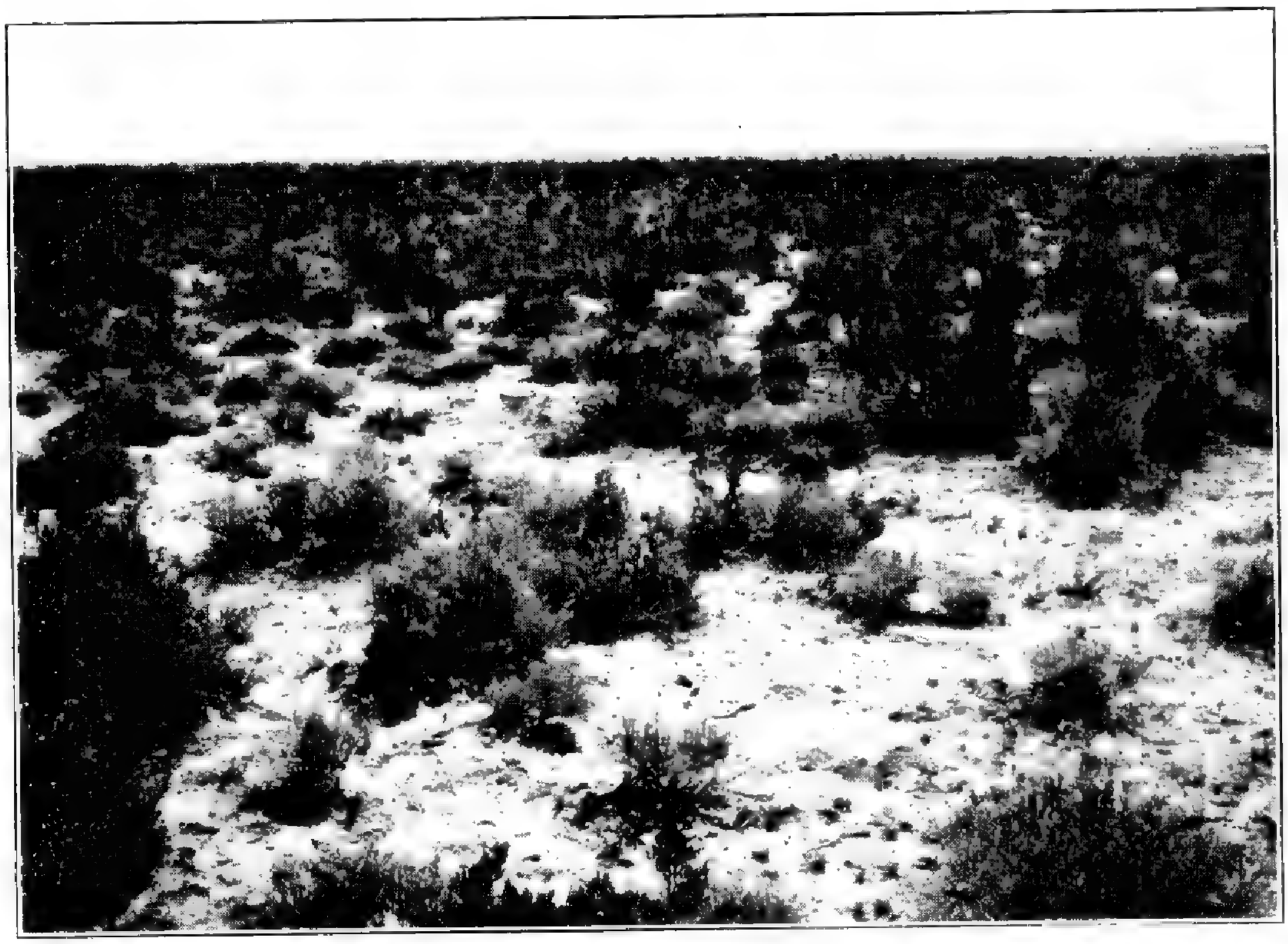
B. GRAY MOLLY ASSOCIATION, TOOELE, UTAH

A nearly pure stand of Gray molly (*Kochia vestita*), with a few plants of shadscale entering in the background. Gray molly occurs on land high in salt content below the surface foot and very fine in texture



A. GREASEWOOD ASSOCIATION, QUINN RIVER VALLEY, NEVADA

Greasewood (*Sarcobatus vermiculatus*) when in full leaf is deep green and contrasts sharply with the gray foliage of many of the desert plants. The soil is heavy in texture and contains amounts of salt harmful to crops



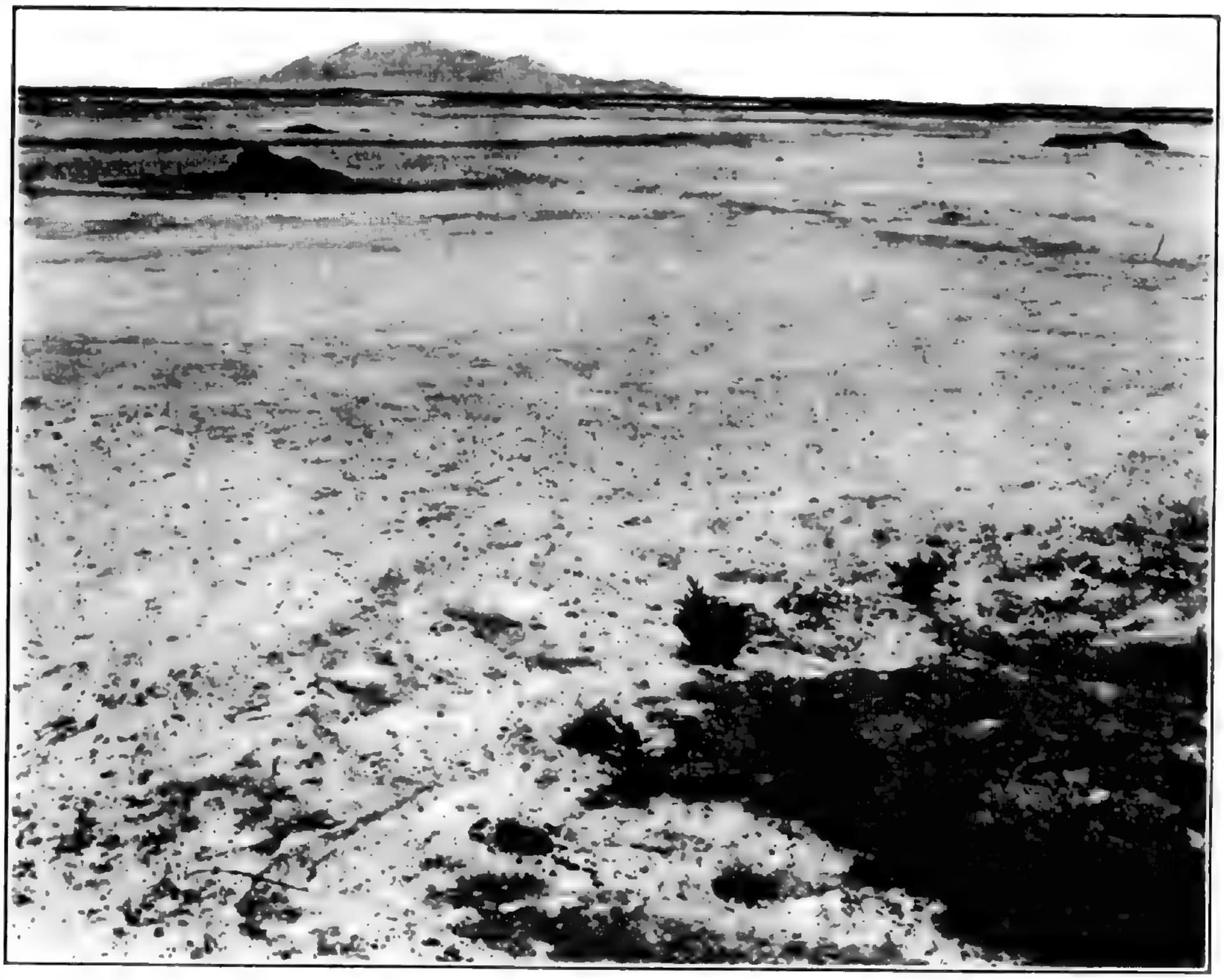
B. GREASEWOOD-SHADSCALE ASSOCIATION, GRANTSVILLE, UTAH

Along the lower portion of shadscale areas greasewood often occurs. Shadscale grows on a heavy soil poorly supplied with water and having a relatively high salt content below the first foot. Greasewood usually occurs on soil where the salt content is high and the water table near the surface



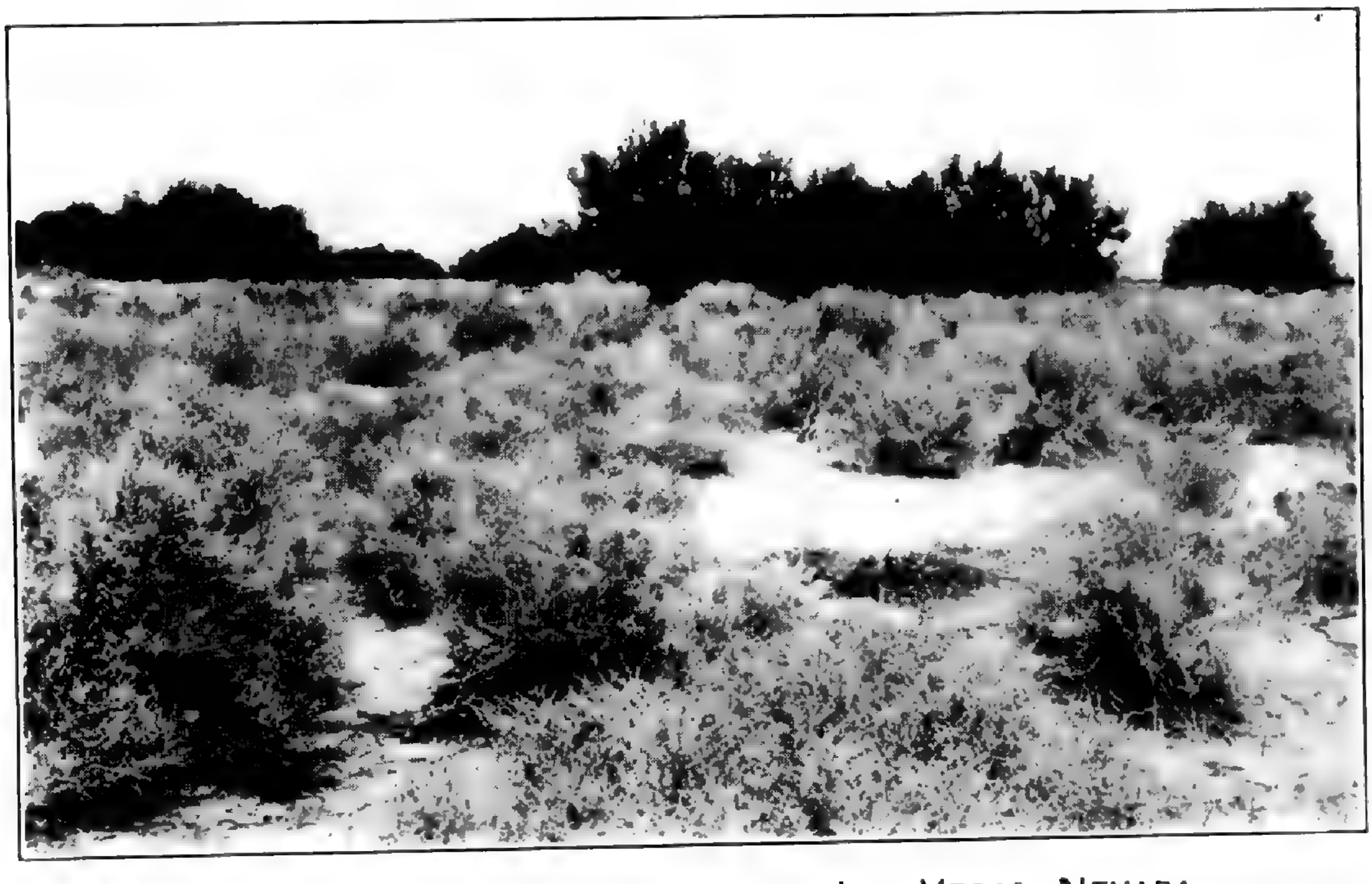
A. PICKLEWEED ASSOCIATION, GRANTSVILLE, UTAH

A zone of pickleweed (*Allenrolfea occidentalis*), lying between a *Sporobolus airoides* zone on the right and a bare salt flat on the left. Pickleweed often covers large areas, usually on land containing over 1 per cent of salt



B. SAMPHIRE ASSOCIATION, GRANTSVILLE, UTAH

Plants of samphire (*Salicornia rubra*) pushing far into a salt flat where the salt content is over 2 per cent. In the distance are hummocks of *Salicornia utahensis*



A. DESERT SALTBUSH ASSOCIATION, LAS VEGAS, NEVADA

A rather open stand of desert saltbush (*Atriplex polycarpa*), with mesquite trees in the back ground. Desert saltbush occurs on land containing only a small amount of salt and, when irrigated, well suited to crop production



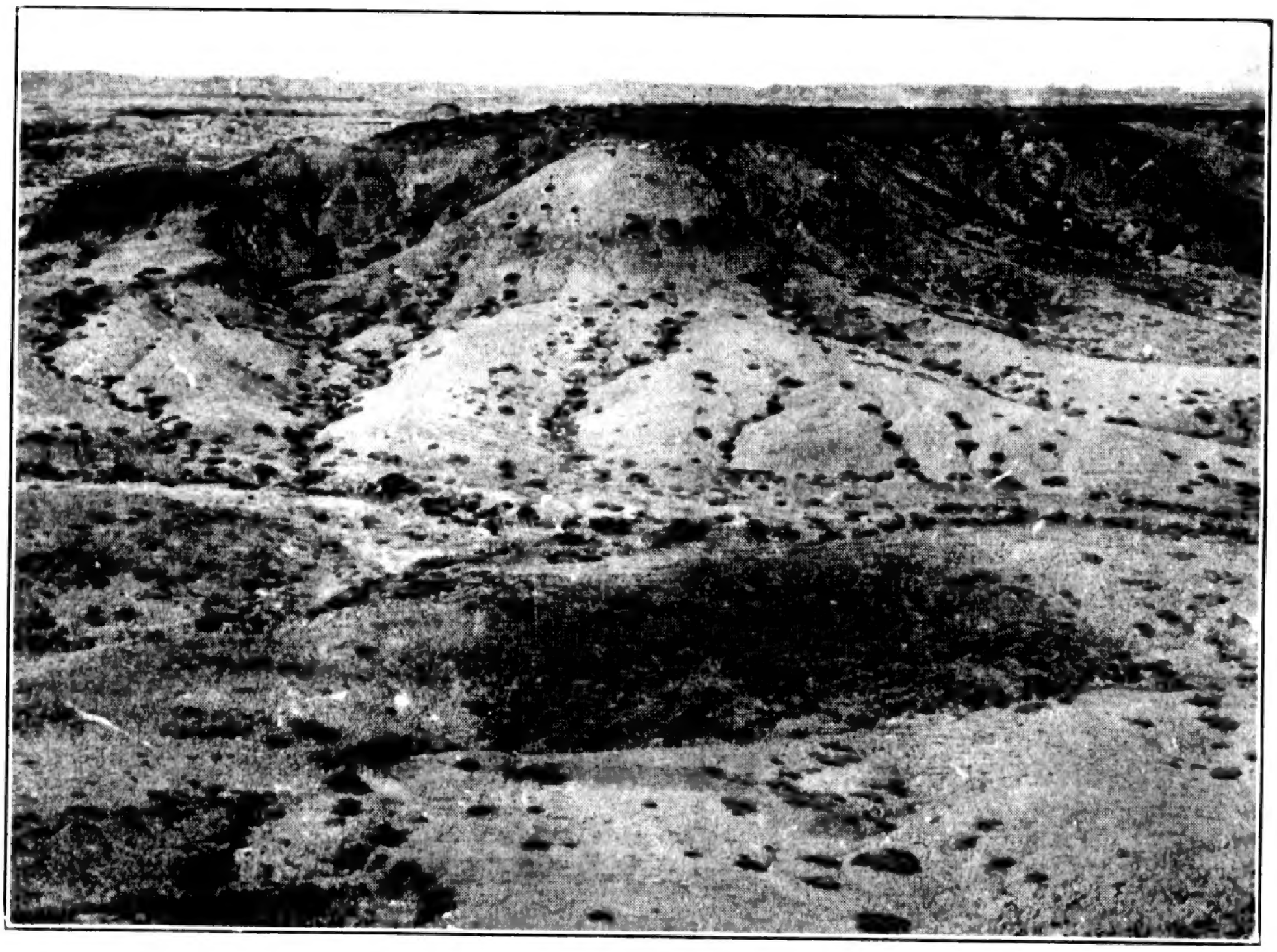
B. CREOSOTE-BUSH ASSOCIATION, SOUTHERN NEVADA

The creosote-bush (*Corillea tridentata*) in fruit. The plants are usually evenly distributed and often very widely spaced. One of the most extensive plant associations of the desert region



A. JOSHUA-TREE ASSOCIATION, LINCOLN COUNTY, NEVADA

The Joshua-tree (*Clistoyucca brevifolia*) is associated in Nevada with *Coleogyne* and *Grayia*. The trees here shown are near their northern limit and are relatively small

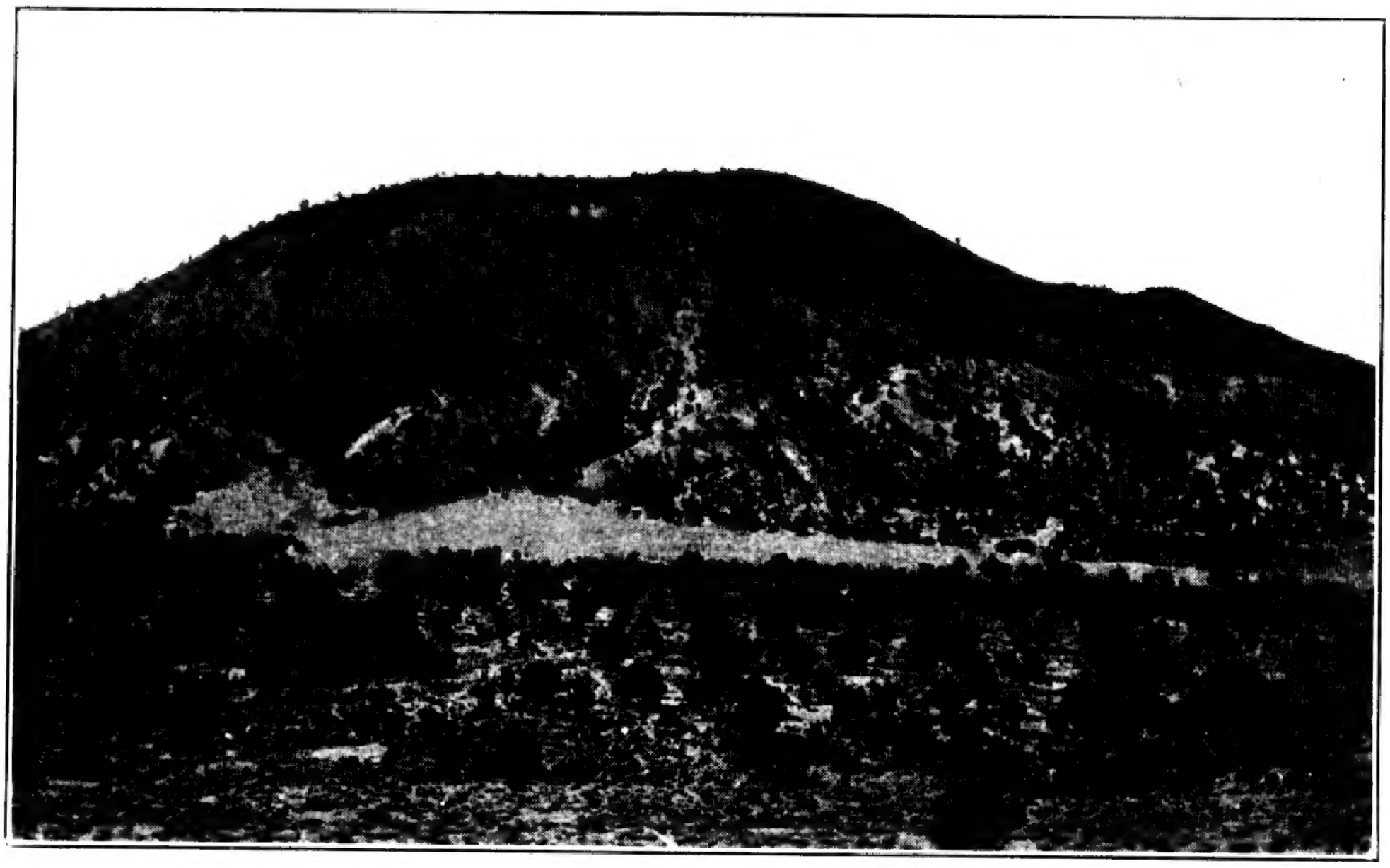


B. MAT SALTBUSH ASSOCIATION, THOMPSON, UTAH

A characteristic view of the eastern desert of Utah, showing the mat saltbush (*Atriplex corrugata*). The growth on this heavy saline soil is sparse and limited largely to the drainage courses

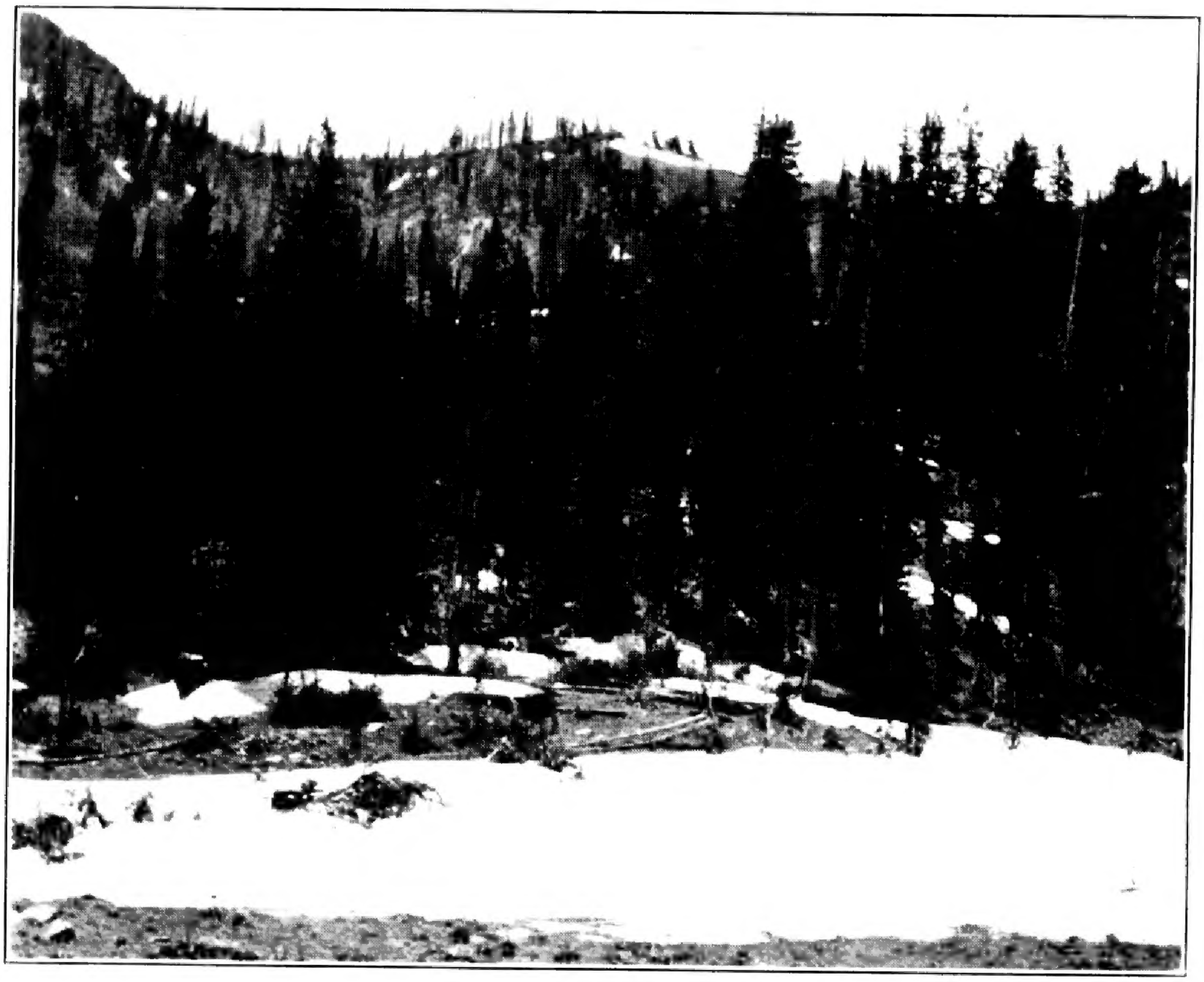


AGED JUNIPERS (JUNIPERUS UTAHENSIS) AT AN ELEVATION OF ABOUT 6,000 FEET (1,800 METERS) IN THE UINTA NATIONAL FOREST, UTAH



A. PINYON-JUNIPER BELT

Pinyon (*Pinus edulis*) and Utah juniper (*Juniperus utahensis*) covering a low mountain range near Fayette, Utah; elevation of the foreground about 5,500 feet (1,650 meters)



B. SPRUCE-FIR BELT

Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) on the south fork of Summit Creek, Cache County, Utah; elevation of the foreground 8,800 feet (2,640 meters)



TYPICAL STAND OF ROCKY MOUNTAIN ASPEN (POPULUS AUREA), FISH LAKE NATIONAL FOREST, UTAH; ELEVATION ABOUT 8,000 FEET (2,400 METERS)